British Council/ NSFC Newton Researcher Links Workshop

Healthcare Technologies for Aging Populations

Chengdu
6-8 December 2016

British Council/ NSFC Newton Researcher Links: Early Career Researchers Workshop

Healthcare Technologies for Aging Populations

Sponsors

We are most grateful for the support of:

NSFC
National Natural Science Foundation of China
国家自然科学基金

Newton Fund

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polymer IRC

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四川省技术转移中心
STTC
SICHUAN TECHNOLOGY TRANSFER CENTER

UK-CHINA amri
Advanced Materials Research Institute

Contents

INTRODUCTION

We extend a warm welcome to this exciting and distinctive event! It is co-hosted by Sichuan University State Key Laboratory for Polymer Materials Engineering and the Polymer IRC, University of Bradford. It combines significant themes, based around the British Council/ NSFC Newton Researcher Links Workshop for Early Career Researchers, which is an important emphasis for our future. This is set in the context of the 8th RCUK Bradford Science Bridges China/ UK-China Advanced Materials Research Institute meeting, which brings together various senior colleagues from our core UK and China member institutions as mentors and advisors to the early career researchers. Our UK EPSRC Centre of Innovative Manufacturing in Medical Devices ('MeDe Innovation' - Leeds, Bradford, Newcastle, Nottingham and Sheffield Universities) is also much in evidence through attendees and support for the Research Exchanges we aim to develop as an output from this event.

This follows our extremely successful first seven workshops held in Beijing, November 2011, Chengdu, April 2012, Bradford, September 2012, Chengdu, March 2013, Bradford November 2013, Beijing, May 2014, and Bradford September 2015. This Research Workshop, in the 'Golden Time' for UK-China relationships, again brings together a strong and growing community of UK and Chinese academic early career researchers, with experts and industrial participants, together with government representatives, in the exploitation of advanced materials, mainly polymer-related materials, with particular interest for application in healthcare technologies for aging populations. The Workshop will explore research interests and identify potential co-operations, including a focus on Research Exchanges, which have been important part of our capacity building in research, joint research student supervision, joint international laboratories and industrial collaborations. Posters and Researcher Profiles provide supporting information to help develop collaborations.

The Workshop is funded primarily by the Newton Fund – British Council Researcher Links programme and the NSFC in China. We will build on our funding success, including the Joint RCUK-MOST call (Dec 2012), and the Program of introducing foreign talents from the world leading academic institutions to Chinese universities (111 Scheme), Sep 2012; MeDe Innovation; and the Royal Society Newton Advanced Fellowship (Changchun and Bradford) – and **the new BUCT-Bradford Joint Laboratory** will be announced at this event. The Workshop will continue to encourage strategic UK-China collaborations, and in addition to Research Exchanges, will aim to develop high quality projects for the RCUK, EPSRC, MOST and NSFC International Collaboration programmes. These activities form a continuing expression of the UK-China Advanced Materials Research Institute (AMRI), which we launched at the Chengdu Workshop in April 2012.

The RCUK Bradford Science Bridges China programme focuses on healthcare technologies, which is one of three strategic areas identified for co-operation between China and the UK. Fuller details on the Science Bridges China platform are provided in a later section of this booklet. Our Advanced Materials emphasis means that we also address other industry sectors, and new applications of advanced materials:

'Advanced Materials' includes:

- *nanomaterials/ nano-biomaterials*
- *biological scaffolds*
- *bone fixation*
- *dental materials*
- *drug delivery*
- *engineered surfaces/ interfaces*
- *medical devices (inc. surgical technologies, instruments, assistive technologies)*
- *medical packaging*
- *precision processing*
- *prostheses*
- *regenerative therapies*
- *soft tissue fixation*
- *smart (stimuli responsive) materials*
- *stents*
- *wound care*

Outlines of research interests for participants are available on our UK-China AMRI web site, www.ukchina-amri.com. Many of the participants have experience of working together with other groups, and across discipline boundaries. We believe that building such skills, trust and friendship between collaborators is of great value and importance for our groups and for our nations.

We look forward to working together with you, and to a very fruitful Workshop!

with warm regards

Professor Phil Coates FREng Conference Chairman

Prof Hesheng Xia

PROGRAMME
Tuesday 6 Dec

	Welcome & Strategy Session			
9.00	Welcome: Sichuan University		Guangxian Li	Sichuan University
9.10	British Council		Kiki Liang	British Council
9.20	Sichuan Province	International Office, Science and Technology Department	Dongyun Yao	Sichuan
		Biomedical Materials, Economic and Information Commission	Jie Yang	Sichuan
9.30	Workshop PI's		Phil Coates,	Bradford University
			Hesheng Xia	Sichuan University
9.55	**Signing**	BUCT-Bradford Joint International Laboratory for Soft Matter Technologies	Liqun Zhang/ Phil Coates	BUCT/ Bradford
10.00	***Photo & coffee***			
	Overviews			
10.30	**Keynote 1**	**Innovative manufacturing of medical devices for musculo-skeletal applications**	**Phil Coates**	
10.50	**Keynote 2**	**Biodegradable Stent Development for Cardiovascular Disease Treatment**	**Yunbing Wang**	NERCB Sichuan
11.10	E1	The Changing Face of Healthcare for Aging Populations	Cristina Tuinea-Bobe	Bradford Uni
11.16	E2	Intelligent e-textile for medical applications	Kai Yang	Southampton Uni
11.22	E3	Sensitive and Visual Biosensing Devices to Promote the Healthcare of Ageing People	Xiaokang Ding	BUCT
11.30	**Team Activity 1**			
	Biomaterials for Tissue Repair			
11.50	E4	Biomaterial-based approaches for healing chronic wounds	Ben Almquist	Imperial College London
11.56	E5	Polymer chain structure design, synthesis and property analysis of polylactides with ultraviolet absorbing function	Long Jiang	Sichuan University
12.02	E6	Layer-by-layer: a bioengineered tool to enhance specific biological activities at nanoscale	Piergiorgio Gentile	Newcastle University
12.08	E7	Development of functionalised membranes with enhanced bioactive properties for bone and cartilage repair	Martin Santocildes Romero	Sheffield University
12.15	***Lunch***			

13.20	**Keynote 3**	**Biomedical materials for tissue repair**	**Pete Twigg**	Bradford University
13.40	E8	High-Throughput Chondrogenesis Screening of Small Molecules in Human Mesenchymal Stem Cells (HMSCs)	Chao Li	Liverpool University
13.46	E9	Decellularised biological scaffolds for musculoskeletal repair: stratification and preclinical evaluation	Anthony Herbert	Leeds University
13.52	E10	Self-assembly of organic molecules for imaging and tumor treatment	Zhigang Xie	Changchun CIACAS
13.58	E11	Porous Inorganic Microspheres for Biomedical Applications: A Platform Technology	Ifty Ahmed	Nottingham University
14.04	E12	Bioactive glasses for bone repair	Ailing Li	ICCAS Beijing
14.10	E13	Dental materials bioinspired from natural proteins	Jianshu Li	Sichuan University
14.16	E14	Enhanced bone regeneration using SLM-enabled electrospinning and injectable microspheres	Thomas Paterson	Sheffield University
14.22	E15	Electrospun Cellulose Nanofiber Scaffolds for Parodontium Reconstructions	Wei Zhang	Sichuan University
14.28	E16	Manufacture and assembly of biopolymer-bioceramic hybrid composites	Natacha Rodrigues	Newcastle University
14.34	E17	Controllable Functionalization of Biomedical Material Surfaces	Shun Duan	BUCT
14.40	***Tea Break***			
	Biomechanical/ Medical Technology			
15.10	**Keynote 4**	**Advanced Elastomers and Related Research in Biomedical Field**	**Liqun Zhang**	BUCT
15.30	**Keynote 5**	**Structure evolution of Long-chain-branched poly (lactic acid) in the process of solid die drawing and its biological properties**	**Lin Ye**	Sichuan University
15.50	**Team Activity 2**			
16.10	E18	Manufacturing and testing the efficacy of non-fouling/antimicrobial materials	Maria Katsikogianni	Bradford University
16.16	E19	Engineering materials for bio-applications	Yang Li	BUCT
16.22	E20	Applications of electrospun polymers for hard and soft tissue engineering	Farshid Sefat	Bradford University
16.28	E21	A new artifical cevercal disc for cervical disease treatment	Yang Meng	
16.34	E22	Innovative manufacturing of medical devices for soft tissue fixation	Karthik Nair	Bradford University

16.40	E23	Development of PLA Bone Fixation Material through Solid Hot Stretching Microfibrillation and Its Biological Properties	Xiaowen Zhao	Sichuan University
16.46	E24	Functional role of prestress in biomechanical structures	Ankush Aggarwal	Swansea University
16.52	E25	Challenges in representing in vivo loading and kinematics for the pre-clinical testing of hip implants	Lee Etchels	Leeds University
16.58	E26	Micro-injection molding of poly(vinyl alcohol) based functional composites	Ning Chen	Sichuan University
17.04	E27	Structure and performance of rotation-extruded polymer pipe	Min Nie	
17.10	E28	Structural evolution of micromoulded poly(ε-caprolactone) upon stretching	Zhiyong Jiang	Changchun CIACAS
17.16	E29	Pressure effect on the viscosity measurement of polymer melts and techniques for structuring polymeric blends & nanocomposites.	Xiang Lin	USTB
17.25	***end***			
18.30	**Banquet**			

Wednesday 7 Dec

	Incorporating Actives			
9.00	**Keynote 6**	**Drug delivery technologies**	**Anant Paradkar**	Bradford University
9.20	**Keynote 7**	**UK-China Collaborations in Materials and Drug Delivery**	**Jiwen Zhang**	Shanghai SIMM CAS
9.40	E30	Binary materials to alter drug delivery properties	David Berry	Durham University
9.46	E31	Clinical applications of polylactones in Tissue Engineering and Drug Delivery	Fei Yang	Beijing ICCAS
9.52	E32	Controlled drug release from polymer matrices prepared through hot-melt extrusion	Rong Chen	Sichuan University
9.58	E33	Drug-Loaded Microfiber for Sustained Antimicrobial Protection and inflammation-responding materials	Rui Shi	Beijing Jishuitan Hospital Peking University
10.04	E34	Dexamethasone-loaded TiO2 nanoparticles to locally target wear-debris induced inflammation	Melissa Rodrigues	Cardiff University
10.10	E35	Nanotechnology in pharmaceutical sciences	Vikaramjeet Singh	Shanghai SIMM CAS
10.16	***Coffee break***			

Invited talks

10.45	IT1	*Biomedical materials for healthcare applications*	Chuhong Zhang	Sichuan University
11.00	IT2	*Micromoulding for medical technologies*	Ben Whiteside	Bradford University
11.15	IT3	*Understanding the structuring process in polymers during processing*	Yongfeng Men	Changchun CIACAS
11.30	IT4	*Healthcare opportunities in SW China*	Sarah Jin	British Consulate Chongqing

Creating & Taking Opportunities - Workshop

11.45 **Funding schemes & Proposal Writing Help & Panel**

Phil Coates, Bradford	*Kiki Liang,* British Council
Hesheng Xia, Sichuan	*Rebecca Jiang,* Foreign Office
Lin Ye, Sichuan	*Anant Paradkar,* Bradford
Pete Twig, Bradford	*Qi Wang,* Sichuan
Liqun Zhang, BUCT	*Yongfeng Men,* Changchun
Dong Qiu, ICCAS	*Sarah Jin,* UK Consulate Chongqing
Jiwen Zhang, SIMMCAS	*Ben Whiteside* Bradford

12.45 ***Lunch***

13.45 Workshop:
initial discussions
Collaborative proposal workup

16.30 Initial pitches

17.30 ***end***

18.30 **Banquet**

Thursday 8 Dec

9.00 **Visit 1** National Engineering Research Centre for Biomaterials (NERCB) & SKLPME, Sichuan University

12.30 ***Lunch***

13.30 **Visit 2** Chengdu OCI Medical Devices Co. Ltd

16.00 **Summary meeting**

17.30 ***end***

18.30 **Banquet**

Support:

Our thanks to:	*Bradford - Polymer IRC - International Programme Manager*	*Xiaolei Wang*	*Bradford University*
	SKLMPE, Sichuan University	*Zhanhua Wang*	*Sichuan University*

Early Career Researcher Profiles

Name	Affiliation	talk
Cristina Tuinea-Bobe	Polymer Interdisciplinary Research Centre, University of Bradford	E1
Kai Yang	Electronics & Computer Science, University of Southampton	E2
Xiaokang Ding	Beijing University of Chemical Technology	E3
Ben Almquist	Bioengineering, Imperial College London	E4
Long Jiang	State Key Laboratory for Polymer Materials Engineering, Sichuan University	E5
Piergiorgio Gentile	Mechanical & Systems Engineering, Newcastle University	E6
Martin Santocildes Romero	School of Clinical Dentistry, Sheffield University	E7
Chao Li	Institute of Integrative Biology, University of Liverpool	E8
Anthony Herbert	Institute of Medical & Biological Engineering, University of Leeds	E9
Zhigang Xie	Changchun Institute of Applied Chemistry, Chinese Academy of Sciences	E10
Ifty Ahmed	Faculty of Engineering, University of Nottingham	E11
Ailing Li	Polymer Physics & Chemistry, Institute of Chemistry Chinese Academy of Sciences Beijing	E12
Jianshu Li	College of Polymer Science & Engineering, Sichuan University	E13
Thomas Paterson	School of Clinical Dentistry, Sheffield University	E14
Wei Zhang	Polymer Research Institute, Sichuan University	E15
Natacha Rodrigues	Mechanical & Systems Engineering, Newcastle University	E16
Shun Duan	Beijing University of Chemical Technology	E17
Maria Katsikogianni	Biomaterials Chemistry, University of Bradford	E18
Yang Li	College of Materials Science & Engineering, Sichuan University	E19
Farshid Sefat	Medical Engineering, University of Bradford	E20

Yang Meng	R&D Department, Wuxi BioLife Medical Equipment Ltd	E21
Karthik Nair	Polymer Interdisciplinary Research Centre, University of Bradford	E22
Xiaowen Zhao	Polymer Research Institute, Sichuan University	E23
Ankush Aggarwal	Zienkiewicz Centre for Computational Engineering, University of Swansea	E24
Lee Etchels	Institute of Medical & Biological Engineering, University of Leeds	E25
Ning Chen	State Key Laboratory for Polymer Materials Engineering, Sichuan University	E26
Min Nie	State Key Laboratory for Polymer Materials Engineering, Sichuan University	E27
Zhiyong Jiang	State Key Laboratory of Polymer Physics and Chemistry, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences	E28
Xiang Lin	University of Science & Technology Beijing	E29
David Berry	Pharmacy, Durham University	E30
Fei Yang	Institute of Chemistry Chinese Academy of Sciences Beijing	E31
Rong Chen	Polymer Research Institute, Sichuan University	E32
Rui Shi	Beijing Jishuitan Hospital, Fourth Clinical Medical College of Peking University	E33
Melissa Rodrigues	School of Pharmacy, Cardiff University	E34
Vikaramjeet Singh	Shanghai Institute of Materia Medica, Chinese Academy of Sciences	E35

Research Profile

Name:	**Dr Cristina Tuinea-Bobe**
Position:	**Senior Research & Knowledge Transfer Development Officer**
Institute/division:	**RKT Centre for Polymer Micro and Nano Technology**
Email:	**c.tuinea-bobe@bradford.ac.uk**
Tel:	+44(0)1274233744

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

Surface characterization, surface chemistry modification, surface structuring of polymers, material properties modification via processing, stretchable conductors, biomedical devices, ultrasound welding, implantable materials.

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

Primary Research interests: *A fuller description of your main research areas.*

Cristina works at the RKT Centre for Polymer Micro and Nano Technology and her main interest areas are:

- Development of bio-medical devices via injection moulding;
- Surface characterisation of different materials and components using: SEM, AFM, White Light Interferometry, Confocal Microscopy;
- Surface chemistry modification via plasma treatment or casting on different surfaces;
- Surface structuring of polymers via injection moulding or photolithographic methods;
- Material properties modification which are affected by different process parameters;
- Stretchable conductors;
- Thin film deposition onto polymers and elastomers;
- Ultrasound monitoring of injection process;
- Ultrasound welding;
- Knowledge transfer between the R&D Institutes and industry.

Topics in which you would like to develop collaborative research:

Please indicate here research areas for which you would like to find partners to undertake joint research.

- *Material properties modification and methods of identifying morphological modification via characterisation methods.*
- *Novel materials used for bio-medical devices.*
- *Surface chemistry change to increase adherence of different particles and thin films.*
- *Morphology and mechanical properties of doped polymers in microinjection moulding.*

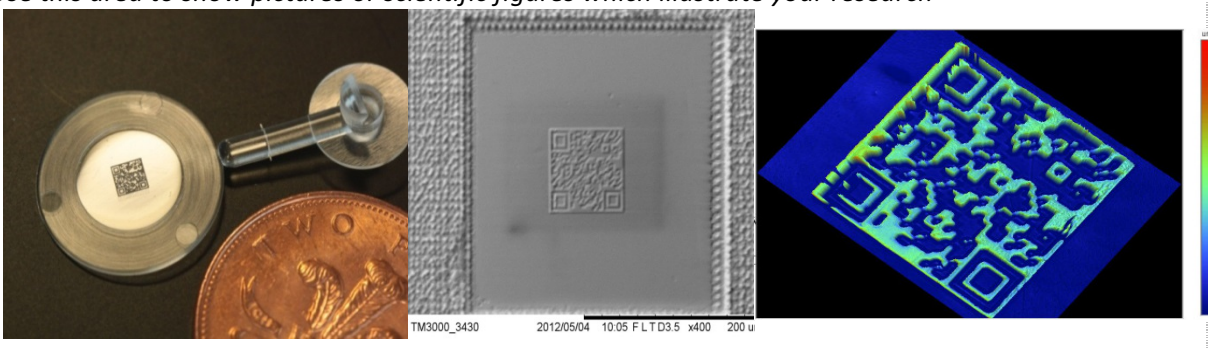
Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

Include here any relevant collaborations you have

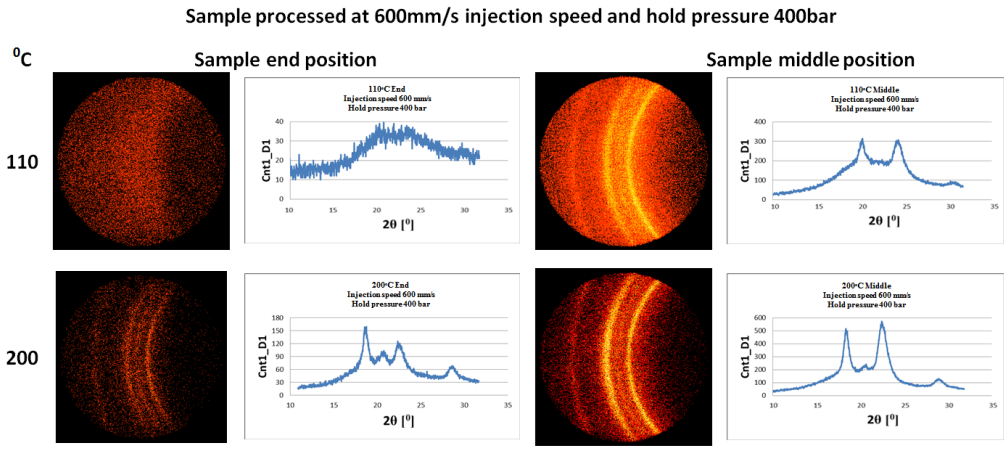
- Science Bridges China
- Nanofactory – ERDF UK Universities collaboration
- Bradford Industry Group
- Yorkshire and Humber based companies
- WARTHE Marie Curie Project
- MeDe Innovation

Relevant graphics, figures, pictures:

Use this area to show pictures or scientific figures which illustrate your research



QR code used for anti-counterfeit technology



Two-dimensional XRD patterns of PEEK processed at 600 mm/s injection speed and hold pressure 400 bar

Publications and other outputs relevant to your interest in this programme (up to 5)

Please give references to your key recent research publications

1. Nair K., Whiteside B.R., Grant C., Patel R. and Tuinea-Bobe C. (2015): "Investigation of Plasma Treatment on Micro-Injection Moulded Microneedle for Drug Delivery" Pharmaceutics, MDPI, Basel, 7 471-485.
2. Y. Gao, X. Dong, L. Wang, G. Liu, X. Liu, C. Tuinea-Bobe, B. Whiteside, P. Coates, D. Wang, C. Han,(2015): "Flow-induced crystallization of long chain aliphatic polyamides under a complex flow field: Inverted anisotropic structure and formation mechanism" Polymer, 73 91-101.
3. Vella P.C., Dimov S.S., Brousseau E,Tuinea-Bobe C., Grant C. and Whiteside B.R. (2014): "A new process chain for producing bulk metallic glass replication masters with micro- and nano-scale features" The International Journal of Advanced Manufacturing Technology .
4. Tuinea-Bobe, C.L., Lemoine, P., Manzoor, M.U., Tweedie, M., D'Sa, R.A., Gehin, C., Wallace, E., Photolithographic structuring of stretchable conductors and sub-kPa pressure sensors, IOP publishing, Journal of Micromechanics and Microengineering, 21 (2011)
5. Manzoor, M.U., Tuinea-Bobe, C.L., McKavanagh, F., Byrne, C.P., Dixon, D., Maguire, P.D., Lemoine, P., Amorphous carbon interlayers for gold on elastomer stretchable conductors, IOP publishing, Journal of Physics D: Applied Physics, 44 (2011) 245301 (9pp)

Research Profile

Name: **Kai Yang**
Position: Senior Research Fellow
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Tel: +44 2380 596665

SUMMARY OF MY RELEVANT RESEARCH AREAS AND EXPERTISES:

Printed electronics, intelligent textiles, wearable medical devices, fabric electrode, ink formulations, printing technologies, stroke rehabilitation, functional electrical stimulation; multidisciplinary project management; enterprise/commercialization; public engagement.

印刷电子，智能纺织品，可穿戴医疗器械，纺织品电极，墨水配方，打印技术，中风康复，电子功能刺激；多学科合作项目管理；科研成果产业化；公众参与。

Primary Research interests:

I have been worked on electronic textiles for 7 years with focus on the e-textile material development and fabrication for medical and healthcare applications. My primary research interests include:

- **Wearable healthcare/medical devices.** I am currently leading a £1.1 million 30 month Medical Research Council (MRC) project on 'Low-cost personalised instrumented clothing with integrated FES electrodes for upper limb rehabilitation'. This project is to bring together a multidisciplinary team's expertise in functional materials, direct printing fabrication, control algorithm, wireless electronics, sensor, and end user engagement to develop a personalised wearable Functional Electrical Stimulation (FES) training system for home based stroke upper limb rehabilitation. The success of this project will lead to the application of future funding for the clinical trials and commercialisation of the technology. The platform technologies developed in this project can also treat hand/arm disabilities resulting from other neurological conditions such as head injury, spinal cord injury, and multiple sclerosis.
- **Ink formulations for intelligent e-textiles.** I have developed a range of state-of-the-art inks (e.g. interface, encapsulation, piezoelectric, electrode) for printing electronics directly on everyday clothing fabrics. This forms the key IP of the university spin-out company Smart Fabric Inks Ltd. I am the lead inventor for the 'Electrodes' patent (patent number: 1608691.0. filed in May 2016). The fabric electrode is a platform technology that can be used in many wearable applications (e.g. muscle stimulation for fitness, gaming and healthcare/medical).
- **Others: additive manufacturing (e.g. screen printing, dispenser printing), biocompatible material development, electrode design and integration.**

Topics in which you would like to develop collaboration:

1. Application development for novel inks, for example, fabric electrode for pain relief, health monitoring, and rehabilitation.
2. Wearable technologies for healthcare/medical applications.
3. Collaboration on grants: Research (e.g. Global Challenges Research Fund); Network; Enterprise.
4. Enterprise and commercialisation.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

- **Companies:** Odstock Medical Limited, Morgan IAT, Lenzing, Source23.
- **Universities:** University College London (UCL), Nottingham University, Loughborough University, University of Dundee, Nottingham Trent University.
- **Others:** Stroke Association, different Strokes, UCL hospitals, Southampton Science Park, Academic Health Science Network (AHSN), Knowledge Transfer Network (KTN), SETsquared Partnership.

Relevant graphics, figures, pictures:

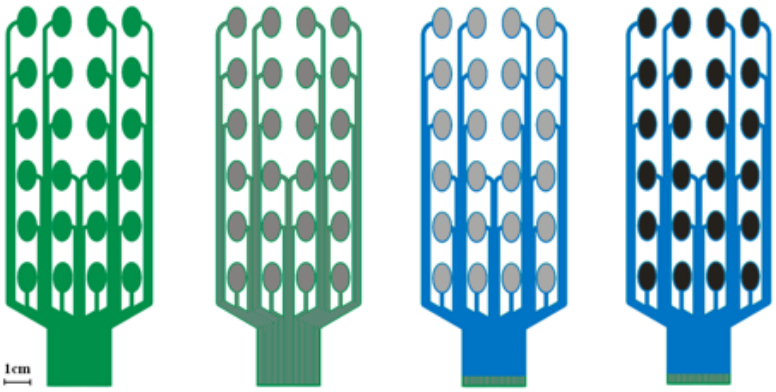


Figure 1. Fabric electrode array printing processing

Figure 2. Fabric electrode array

Figure 3. FES training system for stroke upper limb rehabilitation

Figure 4. Printed Electronics and Materials Lab

Publications and other outputs relevant to your interest in this programme (up to 5)

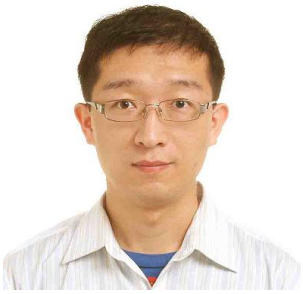
1. Patent: Electrodes, Lead inventor: K. Yang, Patent number: 1608691.0. Filed on 17 May 2016.
2. C. Freeman, K, Yang, J. Tudor, and M. Kutlu, Feedback Control of Electrical Stimulation Electrode Arrays. Medical Engineering & Physics, 38 (1), 1185-1194, 2016.
3. K. Yang, C.T. Freeman, R.N. Torah, S. Beeby, and J. Tudor. Screen Printed Fabric Electrode Array for Wearable Functional Electrical Stimulation. Sensors and Actuators A: Physical, 213, 108-115, 2014.
4. K. Yang, R. Torah, Y. Wei, S. Beeby, and J. Tudor. Waterproof and durable screen printed silver conductive tracks on textiles. Textile Research Journal, 83, (19), 2023-2031, 2013.
5. Sky News http://news.sky.com/story/1698862/swipe-dancing-robots-and-mind-games and www.youtube.com/watch?v=bytIFhQgsrY (Accessed on 31/10/2016).

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile



Name: Ding Xiaokang

Position: Associate Professor
Institute/division: Beijing University of Chemical Technology
Email: dingxk@mail.buct.edu.cn
Tel: 13522317417

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

Biosensors for visual detection of biomolecules; Liquid crystal based immunoassays; Microfluidic devices; Amplification-by-polymerization; Liquid biopsy for disease diagnosis

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

生物分子的可视化检测；基于液晶的免疫分析；微流控器件；通过聚合反应放大检测信号；液体活检疾病诊断

Primary Research interests: *A fuller description of your main research areas.*

Sensitive protease assays for diagnostics of cardiovascular diseases: Cardiovascular diseases (e.g. myocardial infarction) are becoming severe threat among ageing populations. Rapid and sensitive detection of matrix metalloproteinase (MMP-2 or MMP-9) in serum is important to differentiate MI from other diseases with similar symptoms. We developed a peptide-functionalized poly(methacrylic acid) brushes which were grafted from silica nanoparticles. The peptide was cleavable to proteases, thus the fluorescein labeled peptide fragments can be released into the solution for sensitive protease assay. In a proof-of-concept study, the LOD for detecting trypsin can reach 0.8 picomolar owing to the large surface-to-volume ratio of the silica nanoparticles. More importantly, this strategy is versatile, and a successful detection of MMP-2 is also demonstrated with an LOD of 1.1 picomolar.

Liquid crystal based visual immunoassays: Visual detection of protein biomarkers is important for developing point-of-care diagnostic devices. Liquid crystals are birefringent materials which are able to transduce the presence of protein biomarkers into optical signals. We developed a liquid crystal based immunoassay device that can be used at remote areas where the resources are limited.

Topics in which you would like to develop collaborative research:

Please indicate here research areas for which you would like to find partners to undertake joint research.

We intend to seek collaboration in the research areas of developing novel materials and technologies for biosensing to promote the healthcare of ageing people.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Include here any relevant collaborations you have

We currently have one collaboration with Beijing Institute of Heart Lung And Blood Vessel Diseases, Anzhen Hospital, jointly supported by Beijing Natural Science Foundation and Beijing Academy of Science and Technology (L160004).

Relevant graphics, figures, pictures:
Use this area to show pictures or scientific figures which illustrate your research

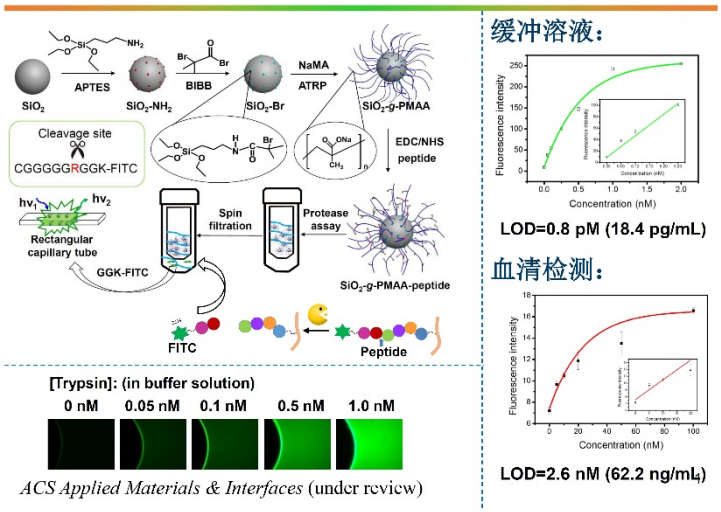


Fig. 1 Sensitive protease assays using peptide functionalized PMAA brushes

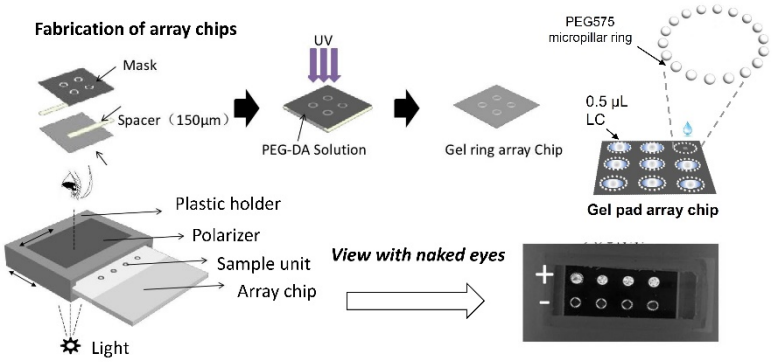


Fig. 2 The liquid crystal based biosensing device for label-free visual immunoassay

Publications and other outputs relevant to your interest in this programme (up to 5)
Please give references to your key recent research publications

(1) Yuan, H.; Yu, B.; Fan, L.-H.; Wang, M.; Zhu, Y.; **Ding, X.***; Xu, F.-J.*, Multiple Types of Hydroxyl-Rich Cationic Derivatives of Pgma for Broad-Spectrum Antibacterial and Antifouling Coatings. *Polym. Chem.* **2016,** *7*, 5709-5718.
(2) Huang, Y.; **Ding, X.**(co-first author); Qi, Y.; Yu, B.*; Xu, F.-J.*, Reduction-Responsive Multifunctional Hyperbranched Polyaminoglycosides with Excellent Antibacterial Activity, Biocompatibility and Gene Transfection Capability. *Biomaterials* **2016,** *106*, 134-143.
(3) **Ding, X.**; Yang, K.-L.*, Quantitative Serine Protease Assays Based on Formation of Copper(ii)-Oligopeptide Complexes. *Analyst* **2015,** *140*, 340-345.
(4) **Ding, X.**; Yang, K. L.*, Antibody-Free Detection of Human Chorionic Gonadotropin by Use of Liquid Crystals. *Anal. Chem.* **2013,** *85*, 10710-10716.
(5) **Ding, X.**; Yang, K. L.*, Development of an Oligopeptide Functionalized Surface Plasmon Resonance Biosensor for Online Detection of Glyphosate. *Anal. Chem.* **2013,** *85*, 5727-5733.

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: **Dr Ben Almquist**

Position: **Lecturer**

Institute/division: **Dept. of Bioengineering, Imperial College London**

Email: **b.almquist@imperial.ac.uk**

Tel: **+44 (0)20 759 46494**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

Elucidating fundamental biological insights into defective wound repair, development of biomaterials and nanotechnologies for tissue engineering/wound healing applications, with a focus on healing diabetic ulcers. Designing nano-bio interfaces for seamless biotic-abiotic integration of devices and tissues.

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

Primary Research interests: *A fuller description of your main research areas.*

Dr Almquist completed his PhD in Materials Science (Stanford University), where he focused on bioinspired nanotechnologies for interfacing electronics with neurons. He then completed his postdoctoral research at MIT as part of the Koch Institute for Integrative Cancer Research, Institute for Soldier Nanotechnologies, and Dept. of Chemical Engineering, where Dr Almquist developed new self-assembled biomaterials for enabling localised biologic (e.g. growth factors, RNAi) delivery to diabetic ulcers.

Main Research Interests:

Basic Science: Epigenetic dysregulation in non-healing dermal wounds and hypertrophic scarring. Identification of patient stratification markers for segmenting diabetic ulcer patients.

Healthcare: Dynamic biomaterials for bidirectional interfaces with cells/tissues. Enabling technologies for localised, combinatorial therapeutic delivery. DNA/RNA Nanotechnology. Nanotechnology-enabled sensors for healthcare applications.

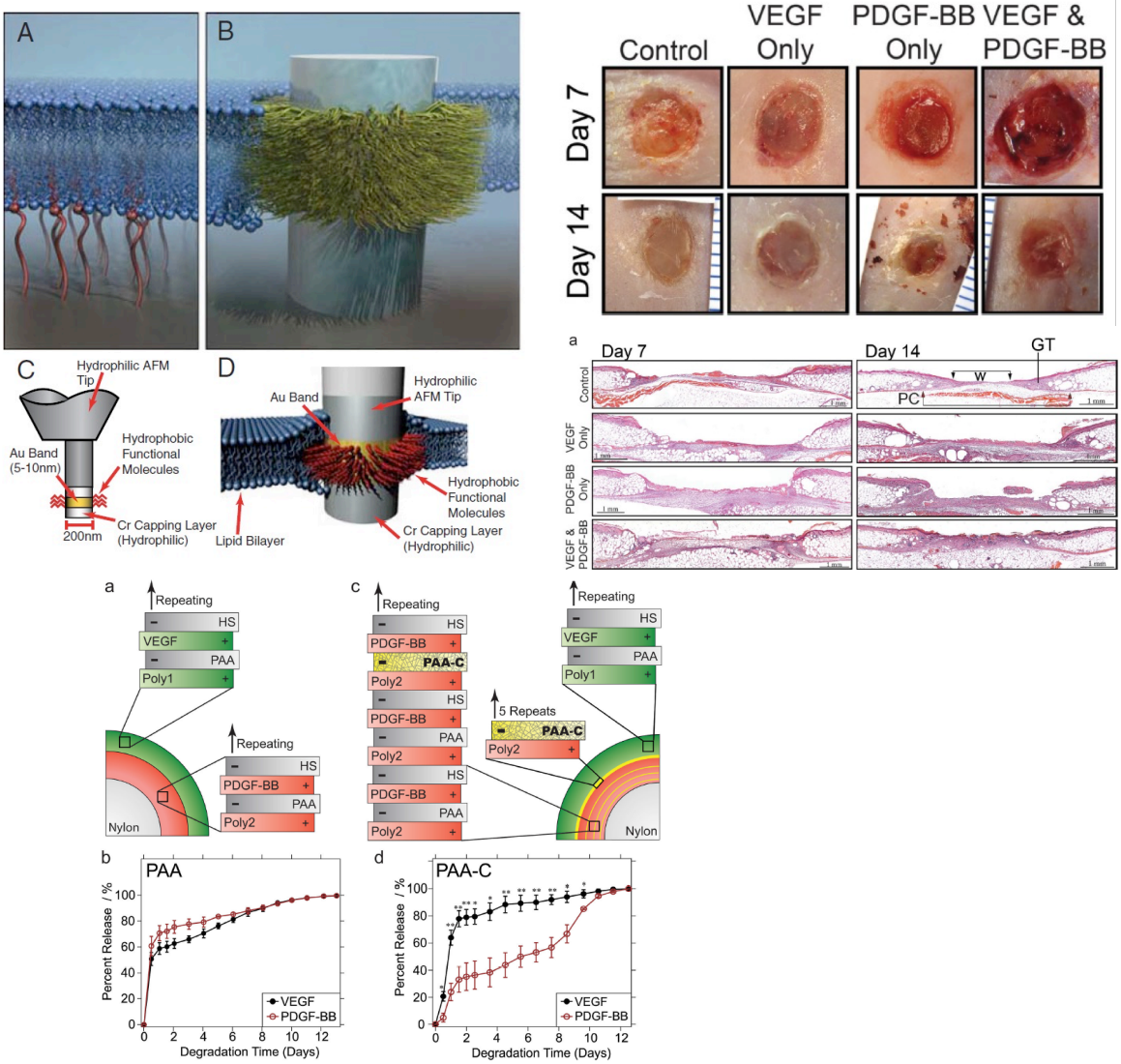
Topics in which you would like to develop collaborative research:

Please indicate here research areas for which you would like to find partners to undertake joint research.

Clinical-based investigation of diabetic ulcers. Development of patient-stratification markers for DFUs. Biomaterial-based strategies for using cytokines as therapies.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Academic: ETH Zurich, University of Manchester, Imperial College London NHS Trust
Industry: Navan Biosciences, Jellagen

Relevant graphics, figures, pictures:



Publications and other outputs relevant to your interest in this programme (up to 5)

1. Stejskalova A, Kiani MT, **Almquist BD**, "Programmable biomaterials for dynamic and responsive drug delivery". *Experimental Biology and Medicine*, **241**, 1127-1137 (2016).
2. Castleberry SA, Golberg A, Sharkh MA, Khan S, **Almquist BD**, Austen Jr WG, Yarmush ML, Hammond PT, "Nanolayered siRNA Delivery Platforms for Local Silencing of CTGF Reduce Cutaneous Scar Contraction in Third-Degree Burns." *Biomaterials*, **95**, 22-34 (2016).
3. Castleberry SA, **Almquist BD**, Li W, Reis T, Chow J, Mayner S, Hammond PT, "Self-Assembled Wound Dressings Silence MMP-9 and Improve Diabetic Wound Healing *In Vivo*." *Advanced Materials,* **28**, 1809-1817 (2016).
4. **Almquist BD**, Castleberry SA, Sun JB, Lu AY, Hammond PT, "Combination Growth Factor Therapy via Electrostatically Assembled Wound Dressings Improves Diabetic Ulcer Healing *In Vivo*." *Advanced Healthcare Materials*, **4**, 2090-2099 (2015).
5. **Almquist BD** & Melosh NA, "Fusion of Biomimetic Stealth Probes into Lipid Bilayer Cores", *Proc. Natl. Acad. Sci. USA*, **107**(13), 5815-5820 (2010).

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: Dr. Long Jiang

Position: Associate Professor
Institute/division: State Key Laboratory of Polymer Materials Engineering, Polymer Research Institute of Sichuan University
Email: jianglong@scu.edu.cn
Tel: +86 28 85407286

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

- *Synthesis and modification of water soluble and/or eco-friendly polymers*
- *Conjugated polymers/semiconductor composites for photo-catalysis*
- *Polymer degradation and stability*

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

- 水性及环境友好高分子材料的合成与改性
- 共轭聚合物/半导体复合光催化材料的制备与应用
- 高分子材料老化与防老化研究

Primary Research interests: *A fuller description of your main research areas.*

Our research interest is to design, synthesize and study polymeric and polymer/inorganic hybrid materials for energy and environment applications. The main research themes include:

(1) Synthesis strategies and related mechanisms for preparing polymeric materials with controlled topology and composition
   - Polyvinyl alcohol-based materials with controlled topology and their potential applications in oil recovery
   - Chain structure design and synthesis of poly(L-lactide) with enhanced UV-shielding properties

(2) Photocatalytic applications of polymer/inorganic hybrid materials
   - Design and synthesis of photo-stable conjugated polymers for efficient solar energy conversion.
   - Construction of heterostructured conjugated polymers/inorganic composites with enhanced photocatalysis performance

Topics in which you would like to develop collaborative research:

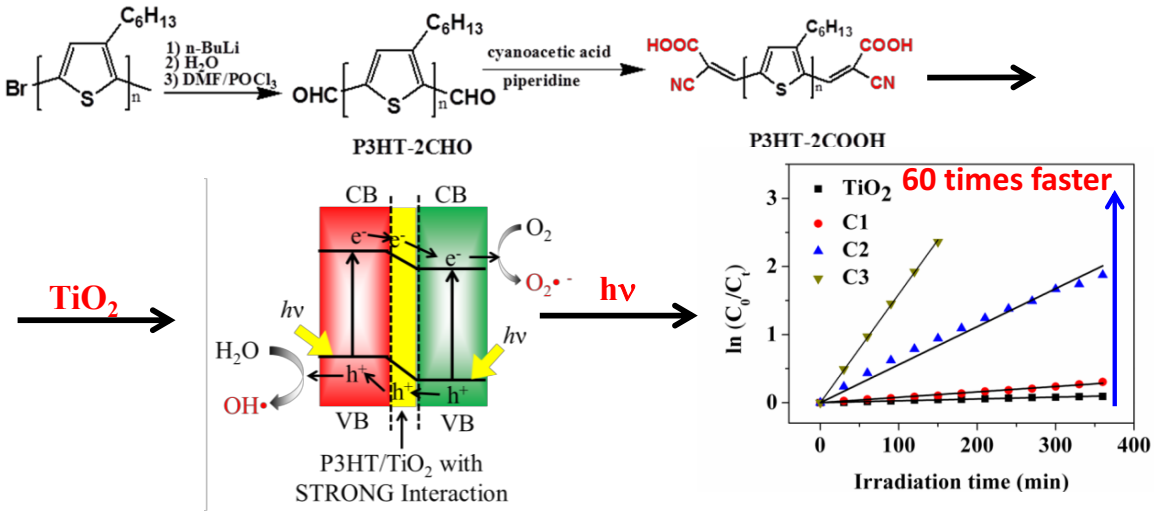
Please indicate here research areas for which you would like to find partners to undertake joint research.

- High performance and multifunctional poly(L-lactide) materials
- Interface engineering of conjugated polymers/inorganic semiconductor heterojunctions toward high-performance photocatalyst

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Include here any relevant collaborations you have

- Institut des Matériaux Jean Rouxel, CNRS, University of Nantes, France
- University of Hull, UK
- Sinopec Sichuan Vinylon Works, Chongqing, China

Relevant graphics, figures, pictures:
Use this area to show pictures or scientific figures which illustrate your research



High Performance P3HT/TiO_2 Hybrid Photocatalyst

Publications and other outputs relevant to your interest in this programme (up to 5)
Please give references to your key recent research publications

[1] Zhang, J.; Yang, H.; Xu, S.; Yang, L.; Song, Y.; **Jiang, L.***; Dan, Y.*; Dramatic enhancement of visible light photocatalysis due to strong interaction between TiO_2 and end-group functionalized P3HT, ***Applied Catalysis B: Environmental***, 2015, 174, 193-202

[2] Yang, L.; Yu, Y.; Gong, Y.; Li, J.; Ge, F.; **Jiang, L.***; Gao, F.; Dan, Y.*, Systematic investigation of the synthesis and light-absorption broadening of a novel diketopyrrolopyrrole conjugated polymer of low and high molecular weight with thermo-labile groups, ***Polymer Chemistry***, 2015, 6, 7005-7014

[3] Yang, L.; Yu, Y.; Zhang, J.; Ge, F.; Zhang, J.; **Jiang, L.***, Gao, F.; Dan, Y.*, Time-dependent aggregaton-induced enhanced emission, absorption spectral broadening, and aggregation morphology of a novel perylene derivative with a large D-Π-A structure, ***Chemistry: An Asian Journal***, 2015, 10, 1215-1224

[4] Ge F.; Ding, Y.; Yang, L.; Huang, Y.; **Jiang, L.***; Dan, Y.*, Effect of the content and distribution of ultraviolet absorbing groups on the UV protection and degradation of polylactide films, ***RSC Advance***, 2015, 5, 70473-70481

[5] Peng, L.; Zhou, T.; Huang, Y.; **Jiang, L.***; Dan, Y.*, Microdynamics mechanism of thermal-induced hydrogel network destruction of poly(vinyl alcohol) in D_2O studied by two-dimensional infrared correlation spectroscopy, ***The Jounal of Physical Chemistry. B***, 2014, 118, 9496-9506

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: **Piergiorgio Gentile**

Position: **Lecturer**

Institute/division: **School of mechanical and systems engineering – Newcastle University**

Email: **piergiorgio.gentile@ncl.ac.uk**

Tel: **+44 0191 208 3620**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

Polymer processing (natural and synthetic polymers); Biomimetic manufacturing (e.g. melt and solution spinning; casting techniques; freeze-drying; bioplotter); Surface functionalisation (e.g. plasma treatment and electrostatic assembly)

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

Primary Research interests: *A fuller description of your main research areas.*

Dr Piergiorgio Gentile is a Biomedical Engineer graduated at the Politecnico di Torino (Turin, Italy), with a PhD research on bioactive polymeric or composite scaffolds for bone tissue regeneration. Piergiorgio joined the School of Mechanical and Systems Engineering at Newcastle University in September 2015 as Lecturer. Currently he is also CEO of Geltis srl (spin-out company of Politecnico di Torino, Italy).

Piergiorgio's mission is best stated using his expertise in biomedical engineering to create, disseminate and apply knowledge to: (1) improve people health, (2) prepare students for changing and challenged companies, and (3) encourage policies that support people healthy development. His research is related to the design, processing and characterisation of biomedical materials (natural and synthetic polymers, ceramics, & composites), aiming to nano- and micro-scale design, manufacturing and functionalisation of biomimetic scaffolds for tissue engineering and regenerative medicine, optimising the physico-chemical properties to enhance cell growth and differentiation.

Main topics are: (1) processing of natural and synthetic polymers; (2) biomimetic approach to produce scaffolds able to mimic the physical and biological properties of the native tissues, through various techniques (e.g. melt and solution spinning; freeze-drying; 3D printing); (3) surface functionalisation to obtain nanostructures containing drug(s)/biomolecule(s) to achieve specific biological responses; (4) biological evaluation of bioengineered constructs using basic/advanced skills in cell culture; (5) translational research approach to apply basic research to clinical applications.

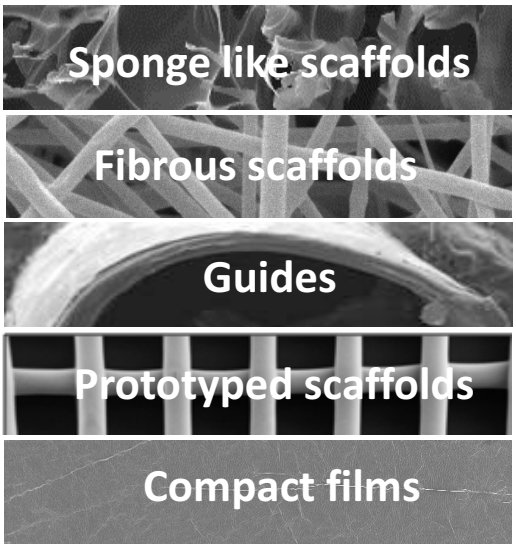
Topics in which you would like to develop collaborative research:

Please indicate here research areas for which you would like to find partners to undertake joint research.

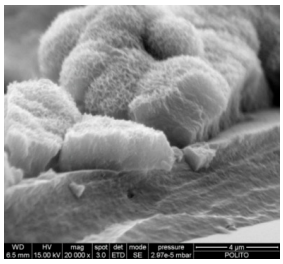
Nanocomposites or polymers with tuneable physico-chemical properties for the manufacturing of implantable medical devices; Surface functionalisation at the nanoscale in order to obtain suitable biological activities; Smart scaffolds for Tissue Engineering applications, e.g. bone, cartilage, soft tissue regeneration.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Include here any relevant collaborations you have
UK: Sheffield, UCL, Leeds, Loughborough, Bradford. Italy: Turin, Milan, Modena and Reggio Emilia, Ancona.

Relevant graphics, figures, pictures:

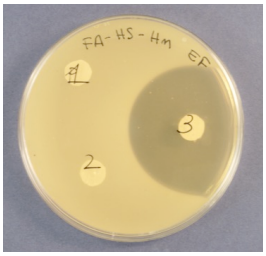


Overview of the manufactured medical devices

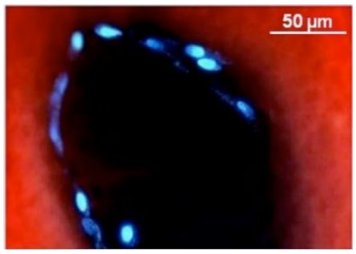


Bioactive materials able to induce deposition of hydroxyapatite

Injectable biodegradable cement



Antimicrobial surface



Cells biocompatibility

Publications and other outputs relevant to your interest in this programme
Please give references to your key recent research publications

∞ Gentile, M.E. Frongia, M. Cardellach Redon, C.A. Miller, G.P. Stafford, G. Leggett, P.V. Hatton. Functionalised nanoscale coating via Layer-by-Layer technique to impart antibacterial properties of PLGA biofilms, Acta Biomater. 2015, 21, 35-43.

∞ P. Gentile, V.K. Nandagiri, R. Pabari, J. Daly, C. Tonda-Turo, G. Ciardelli, Z. Ramtoola. *Influence of Parathyroid Hormone-Loaded PLGA Nanoparticles in Porous Scaffolds for Bone Regeneration*, Int. J. Mol. Sci. 2015, 16(9), 20492-20510.

∞ P. Gentile, V.K. Nandagiri, J. Daly, V. Chiono, C. Mattu, C. Tonda-Turo, G. Ciardelli, Z. Ramtoola. *Localised controlled release of simvastatin from porous chitosan-gelatin scaffolds engrafted with simvastatin loaded PLGA-microparticles for bone tissue engineering application*, Mater Sci Eng C 2016, 59, 249-257.

∞ P. Gentile, C. Ghione, C. Tonda-Turo, and D.M Kalaskar. Peptide functionalisation of nanocomposite polymer for bone tissue engineering using plasma surface polymerisation, RSC Advances, 2015, 5(97), pp. 80039-80047

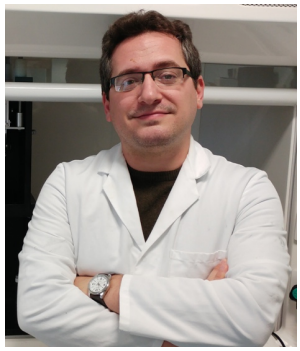
∞ P. Gentile, I. Carmagnola, T. Nardo, V. Chiono. *Layer-by-layer assembly for biomedical applications in the last decade*, Nanotechnology. 2015, 26(4), 422001.

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile



Name: **Dr Martin Eduardo Santocildes Romero**

Position: **Postdoctoral Research Associate**

Institute/division: **School of Clinical Dentistry, University of Sheffield**
EPSRC MeDe Innovation

Email: m.e.santocildes-romero@sheffield.ac.uk

Tel: **(00) 114 271 7890**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English

My main research area is the development of functionalised membranes for tissue engineering and regenerative medicine (e.g. bone and cartilage repair) using electrospinning. Additionally, I am working on the development of bioadhesive electrospun patches for clinical dental applications (e.g. localised drug delivery).

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

Primary Research interests:

I am a graduate in Biology (University of Malaga, Spain) and Biomedical Engineering (University of Sheffield, UK), and I have undertaken research leading towards a PhD at the University of Sheffield on the development of electrospun materials containing strontium-substituted bioactive glasses for bone tissue regeneration. Currently, I am working as a Postdoctoral Research Associate at the School of Clinical Dentistry of the University of Sheffield on a project funded by EPSRC MeDe Innovation.

My main research interests and areas of expertise are:

- **Development of functionalised biomaterials for enhanced tissue regeneration:** Combination of bioresorbable polymers and bioactive materials (e.g. bioactive glasses, proteins) using electrospinning; Manufacture of composite biomaterials; Characterisation of material properties (e.g. SEM, XRD, DTA) and biological properties (e.g. cytotoxicity, osteogenic properties) of biomaterials.
- **Development of drug delivery systems:** Development of bioadhesive polymeric compositions using pharmaceutically approved polymers; Manufacture of electrospun patches for clinical dental applications.
- **Cell culture:** Extensive experience working with animal cell lines (e.g. Rat osteosarcoma, L929, MG63) and primary cells (e.g. Mesenchymal stromal cells isolated from rat bone marrow; Bovine synovial fluid mesenchymal stromal cells) for the biological characterisation of biomaterials.

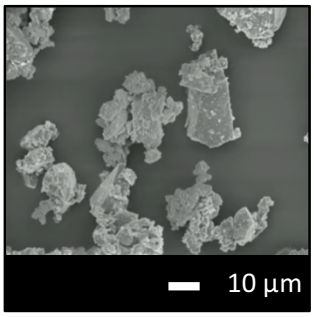
Topics in which you would like to develop collaborative research:

- Development of biofunctionalised electrospun membranes combining polymers and/or proteins (e.g. collagen, proteoglycans, elastin) for the repair of bone, cartilage or ligaments.
- *In vivo* study of composite electrospun membranes made of bioresorbable polymers and particles of bioactive glasses (e.g. 45S5, strontium-substituted bioactive glass).

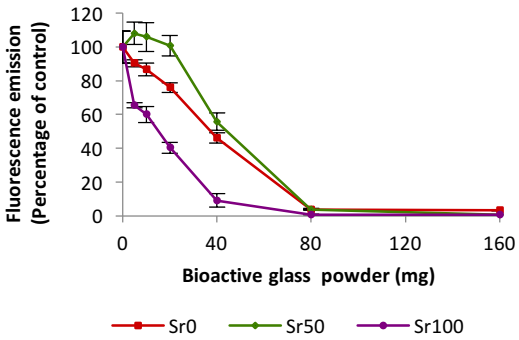
Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

- Ongoing collaboration with researchers from MeDe Innovation institutions: Mr Thomas Paterson (University of Sheffield) and Dr Maria Katsikogianni and Dr Karthik Nair (University of Bradford) for the development of novel biomaterials with osteogenic and antibacterial properties.

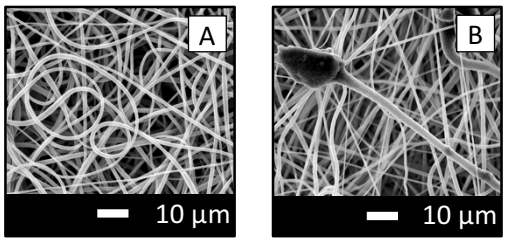
Relevant graphics, figures, pictures:



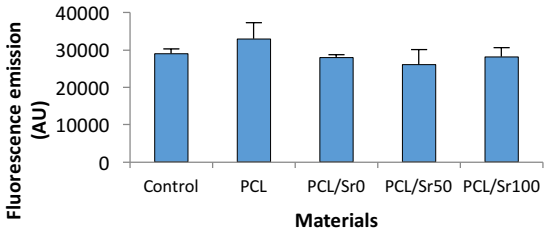
SEM micrograph of strontium-substituted bioactive glass powder (<45∝m particle size).



The increased solubility of strontium-substituted glass resulted in a greater cytotoxic effect. However, 50% substitution (Sr50) had a stimulating effect when small amounts (<20 mg) were used.



SEM micrographs of (A) electrospun PCL fibres, and (B) electrospun composite fibres made of PCL and bioactive glass particles. The composite fibres in (B) show regions of increased diameter where the particles accumulate.



Rat osteosarcoma cells cultured on samples of the composite electrospun membranes showed good *in vitro* biocompatibility, as measured using the PrestoBlue viability assay.

Publications and other outputs relevant to your interest in this programme (up to 5)

1. Santocildes-Romero ME, Goodchild RL, Hatton PV, Crawford A, Reaney IM, Miller CA. Preparation of composite electrospun membranes containing strontium-substituted bioactive glasses for bone tissue regeneration. Macromol Mater Eng. 2016;301(8):972–81.

2. Santocildes-Romero ME, Crawford A, Hatton PV, Goodchild RL, Reaney IM, Miller CA. The osteogenic response of mesenchymal stromal cells to strontium-substituted bioactive glasses. J Tissue Eng Regen Med. 2015 May;9(5):619–31.

Research Profile

Name: **Dr Chao Li**
Position: **Research Associate**
Institute/division: **Institute of Integrative Biology, University of Liverpool**
Email: **Chao.Li@liverpool.ac.uk**
Tel: **+44 1517954454**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

High-Throughput Chondrogenesis Screening of Small Molecules in Human Mesenchymal Stem Cells (HMSCs)

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

在间充质干细胞中高通量筛选成软骨发生小分子化合物

Primary Research interests: *A fuller description of your main research areas.*

Dr Chao Li obtained his PhD in Cell Biology from the Sun Yat-sen University, also known as Zhong shan University (Guang Zhou, China). He began working with stem cells and gene targeting as a post-doctoral associate at the University of Edinburgh and then joined Anthony Hollander's group to develop assays for high-throughput chondrogenesis screening of small molecules in human mesenchymal stem cells (HMSCs) at the University of Liverpool.

Human mesenchymal stem cells (HMSCs) hold great promise in the regeneration of cartilage lesions. However, despite the fact that HMSCs have been used to generate chondrocytes *in vitro* and for the tissue engineering of cartilage, they have only rarely been used clinically in regenerative medicine. This is because scaled up procedures for the routine production of implantable cartilage of consistently high quality remains a significant challenge, in part because of the lack of standardised markers for isolation of a functional cell population optimised for chondrogenesis. Our group recently identified ROR2 (receptor tyrosine kinase like orphan receptor 2) as a cell surface marker that is upregulated on those bone marrow-derived HMSCs most able to undergo chondrogenic differentiation. I am studying the biology of these unique stem cells and seeking to develop a high throughput screening method using upregulation of ROR2 gene expression to identify novel chondrogenic molecules.

Topics in which you would like to develop collaborative research:

Please indicate here research areas for which you would like to find partners to undertake joint research.

Treatments of OA developed primarily by researchers from biological or clinical sciences, who prefer the cell-based treatments. Input from colleagues trained in engineering has been modest. This situation must change, if I am to take full advantage of the power of modern engineering technology to design the biomaterials of the future. I study the fundamental biology of stem cells and tissue engineering. But I am also interested in cell-free product that supports the regeneration of articular cartilage and bone tissue.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Include here any relevant collaborations you have

The UK Regenerative Medicine Platform (UKRMP) Niche Hub
It is composed of 8 partner institutions with 21 principal investigators (PIs) and 10 Post-Doctoral Research Assistants (PDRAs) from University of Edinburgh (MRC Centre for Regenerative Medicine), University of Cambridge, Imperial College London, Keele University, Kings College London, University of Manchester and University of Strathclyde

Relevant graphics, figures, pictures:
Use this area to show pictures or scientific figures which illustrate your research

Fig 1. Generation of ROR2 reporter human mesenchymal stem cells (HMSCs) for high –through chondrogenesis screening

Fig 2. Multiplex qRT-PCR assay for high-throughput chondrogenesis screening small molecules in human mesenchymal stem cells (HMSCs)

Fig 1.

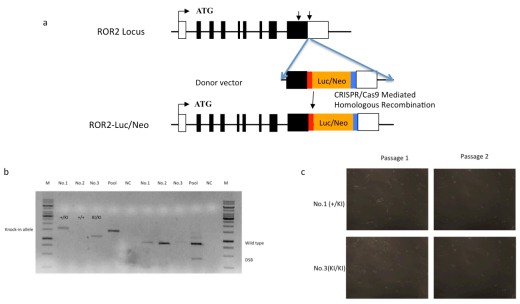
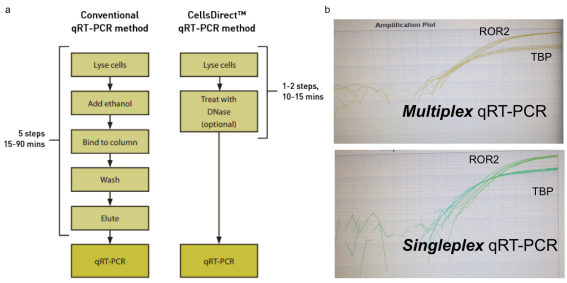


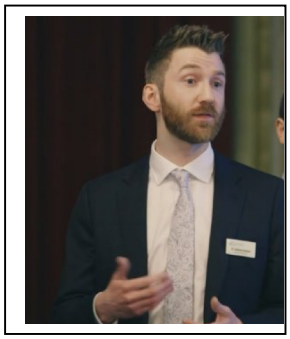
Fig 2.



Publications and other outputs relevant to your interest in this programme (up to 5)
Please give references to your key recent research publications

1. Liu L, Bailey SM, Okuka M, Muñoz P, **Li C**, Zhou L, Wu C, Czerwiec E, Sandler L, Seyfang A, Blasco MA, Keefe DL. (2007). "Telomere lengthening early in development." Nat Cell Biol **9**(12): 1436-1441.
2. Liu L, Okuka M, **Li C**, Zhou L, Wu C, Keefe D L, Yang X. (2008) . "Telomere reprogramming early in development and cloning." Cell Research **18**:s18. doi: 10.1038/cr.2008.108
3. **Li C**, Chen Z, Liu Z, Huang J, Zhang W, Zhou L, Keefe DL, Liu L. (2009). "Correlation of expression and methylation of imprinted genes with pluripotency of parthenogenetic embryonic stem cells." Hum Mol Genet **18**(12): 2177-2187.
4. Myant K, Termanis A, Sundaram AY, Boe T**, Li C**, Merusi C, Burrage J, de Las Heras JI, Stancheva I. (2011). "LSH and G9a/GLP complex are required for developmentally programmed DNA methylation." Genome Res **21**(1): 83-94.
5. **Li C**, Katopodi T, Brady K, Salerno A, Hollander A. (2016). "Validation of One-step Reverse Transcription RT-qPCR for High–Throughput Screening of Small molecules in Human Mesenchymal Stem Cells." Cartilage (Accepted)

Research Profile



Name: Dr Anthony Herbert

Position: ETERM Landscape Fellow
Institute/division: Institute of Medical and Biological Engineering (iMBE), University of Leeds
Email: A.Herbert@leeds.ac.uk
Tel: +44(0)113 3437371

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Tissue biomechanics of hard and soft biological tissues; Manufacture and optimisation of scaffolds; Bioreactors for use in tissue engineering; In-vitro and ex-vivo biomechanical assessment of interventional products; Surgical implantation techniques and development; Joint simulation to pre-clinically functionally assess interventional products.

Brief summary of your research areas, in Chinese

Primary Research interests:

To date my work at iMBE in Leeds has focused around the development of decellularised porcine superflexor tendon (pSFT) and human bone-patellar tendon-bone (hBTB) for anterior cruciate ligament (ACL) repair including biomechanical, biochemical, biocompatibility and sterilisation investigations, and coordinating with orthopaedic and veterinary surgeons at contract research organisations to successfully complete large animal trials in sheep.

Recently, I have started an ETERM landscape fellowship with the aim of completing **three distinct, specialised levels of product development** in the translational pathway. **1. Stratification** – optimisation of acellular hBTB and pSFT products through a population specific and stratified approach. **2. Implementation** – identifying the correct fixation methods involved in implanting these products and optimising the product/host interface. **3. Function and Performance** – Utilising existing in-vitro natural joint simulation platforms to functionally assess the implanted products at a physiological level. It is predicted that utilising such an approach will systematically reduce the risks involved in the translation of these products and other similar new medical devices and interventions.

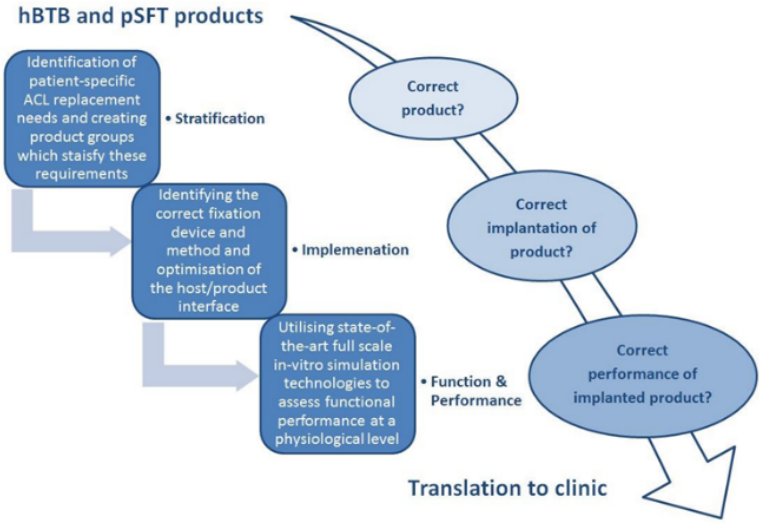
Although I am currently exploring the use of soft and hard biological scaffolds for replacement of tissues in the knee, I am keen to explore these musculoskeletal interventions in other relevant areas such as the ankle and shoulder and would welcome collaboration on these fronts.

Topics in which you would like to develop collaborative research:

ACL replacement, rotator cuff tear treatment, development and evaluation of novel orthopaedic fixation devices, evaluation of scaffolds for soft or hard tissue replacement/augmentation, tendon to bone anchor devices, bone grafting methods in combination with orthopaedic implants.

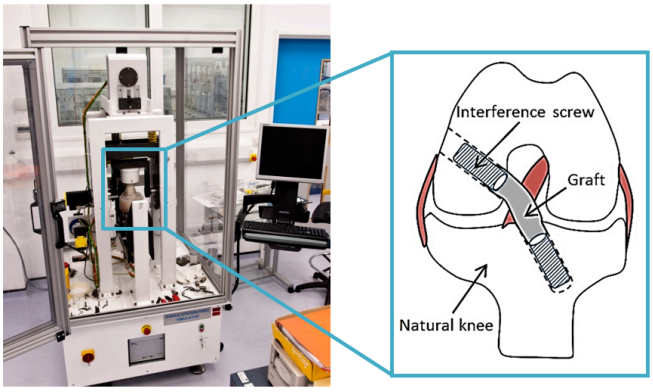
Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Tissue Engineering and Regenerative Medicine (TERM) network, UK: University of Sheffield, University of Nottingham, University of York, University of Loughborough, Keele University; MeDe Innovation; NHS Blood and Transplant services; University of Strathclyde, Glasgow.

Relevant graphics, figures, pictures:

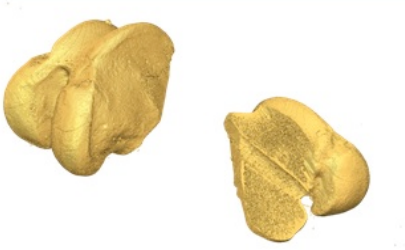


Strategy for translation of decellularised ACL products

Decellularised products



Single station natural knee joint simulator



Micro-CT evaluation of bone tunnel

Publications and other outputs relevant to your interest in this programme

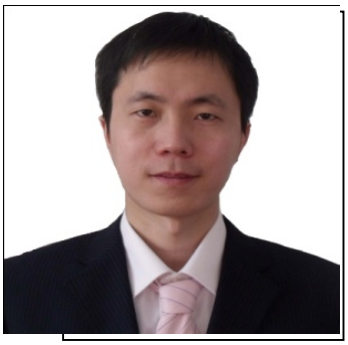
- Jones, G.L., Herbert A., Berry, H., Edwards, J.H., Fisher, J., Ingham, E. 2016. Decellularisation and characterisation of porcine superflexor tendon: a potential anterior cruciate ligament replacement. Tissue Engineering: Parts A, B, and C. ISSN 1937-3368 (In Press).
- Edwards, J.H., Herbert, A., Jones, G.L., Manfield, I.W., Fisher, J., Ingham, E. 2016. The effects of irradiation on the biological and biomechanical properties of an acellular porcine superflexor tendon graft for cruciate ligament repair. J. of Biomed Mats Res: Part B. DOI: 10.1002/jbm.b.33786.
- Herbert, A., Brown, C., Rooney, P., Kearney, J., Ingham, E., Fisher, J. 2016. Material property determination of acellular human patellar tendon grafts for use in anterior cruciate ligament replacement. J. of Biomech, 49(9), 1607-1612.
- Herbert, A., Jones, G.L., Ingham, E., Fisher, J. 2015. A biomechanical characterisation of acellular porcine super flexor tendons for use in anterior cruciate ligament replacement: Investigation into the effects of fat reduction and bioburden reduction bioprocesses. J. of Biomech, 48(1), 22-29.

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile



Name:	**Zhigang Xie**
Position:	**Professor**
Institute/division:	**Changchun institute of applied Chemistry, CAS**
Email:	**xiez@ciac.ac.cn**
Tel:	**86-431-85262775**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Organic polymeric nanoparticles for drug loading and delivery; fluorescent nanoparticles for imaging and theranostics; porous polymers for biomedical applications.

用于药物负载和递送的有机高分子纳米材料；用于成像和诊断治疗的荧光纳米颗粒；多孔聚合物在生物医学上的应用。

Primary Research interests:

Nanomedicine: • synthesis of polymeric nanomedicines via self-assembly • organic nanoparticles from drug conjugates • prodrug from paclitaxel • cisplatin-based nanodrug • Polymeric micelles and polymeric drug conjugates

Fluorescent nanoparticles: • Organic fluorescent nanoparticles • carbon dots • BODIPY • cyanines • grapheme quantum dots

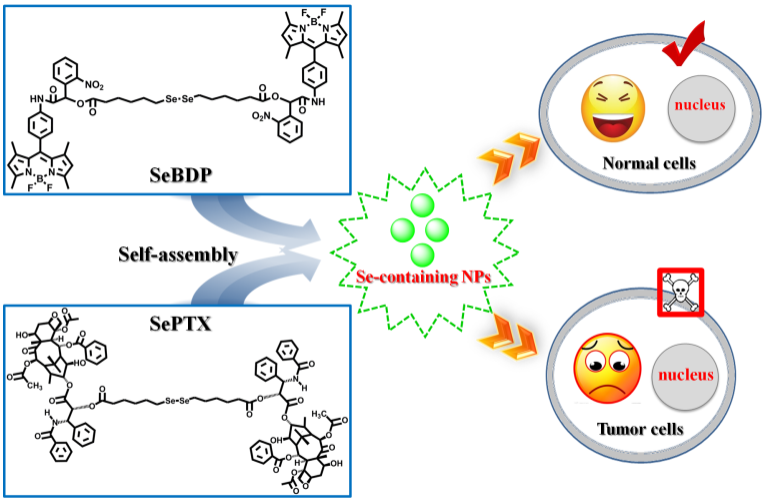
Porous polymers: metal-organic frameworks • covalent organic frameworks • cross-linked polymers • cages • organic crystals

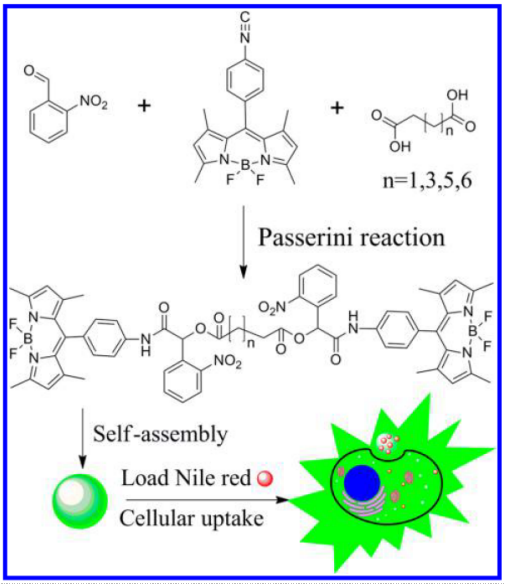
Topics in which you would like to develop collaborative research:

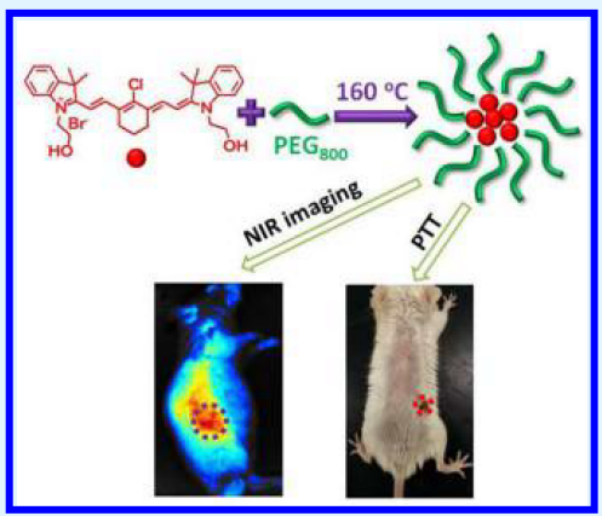
Fluorescent bioimaging agents selectively for tumor cells in vitro and in vivo.
Nanomedicines for translation.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
None yet.

Relevant graphics, figures, pictures:







Publications and other outputs relevant to your interest in this programme (up to 5)

[1] Wang W, Wang L, Li Y, Liu S, Xie Z, Jing X. Nanoscale Polymer Metal-Organic Framework Hybrids for Effective Photothermal Therapy of Colon Cancers. Advanced Materials. 2016; in press.
[2] Zhang W, Lin W, Pei Q, Hu X, Xie Z, Jing X. Redox-Hypersensitive Organic Nanoparticles for Selective Treatment of Cancer Cells. Chemistry of Materials. 2016;28:4440-6.
[3] Zheng M, Ruan S, Liu S, Sun T, Qu D, Zhao H, et al. Self-Targeting Fluorescent Carbon Dots for Diagnosis of Brain Cancer Cells. ACS Nano. 2015;9:11455-61.
[4] Zheng M, Liu S, Li J, Qu D, Zhao H, Guan X, et al. Integrating oxaliplatin with highly luminescent carbon dots: an unprecedented theranostic agent for personalized medicine. Advanced Materials. 2014;26:3554-60.
[5] Lin W, Sun T, Xie Z, Gu J, Jing X. A dual-responsive nanocapsule via disulfide-induced self-assembly for therapeutic agent delivery. Chemical Science. 2016;7:1846-52.

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: **Dr Ifty Ahmed**

Position: **Associate Professor**

Institute/division: **University of Nottingham, Faculty of Engineering, Advanced Materials Research Group**

Email: **ifty.ahmed@nottingham.ac.uk**

Tel: **00 44 115 7484675**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

Manufacture and characterisation of Bioglasses, calcium phosphate glasses, bioactive glass fibres and more recently, porous inorganic microspheres from bioglasses and glass ceramics. Recent developments include stem cell loaded microspheres for minimally invasive regeneration of bone disorders. Also work on fully resorbable composites, mainly phosphate-glass fibre reinforced composites, to replace metal plates currently used for bone repair applications.

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

Primary Research interests: *A fuller description of your main research areas.*

Main research interests include manufacture of novel structures (i.e. fibres, microparticles and bulk and porous microspheres) from bioglasses (i.e. phosphate, silicate and borate glass families) including glass ceramics (i.e. apatite wollastonite).

Phosphate-based glasses offer fully controlled degradation properties. The principal chemical constituent of bone mineral is calcium phosphate, and these glasses mainly contain P_2O_5, CaO and Na_2O. Increasing or decreasing the oxide components or incorporating others enables further control over their dissolution rates (from a day/s, week/s, months to years).

I have developed fibre manufacturing facilities and Nottingham, and we are working with a Chinese company to scale-up the fibre manufacturing process. The fibres are mainly used for Biocomposites research, which has focussed on their use as fully resorbable bone fracture fixation devices. These materials could resorb within the body gradually transferring load to the healing bone as it degrades, avoiding stress shielding effects during the bone repair process.

More recently, we have developed (for the first time) porous inorganic microspheres from the above mentioned glass and glass-ceramic families. These microspheres are currently being explored for stem cell materials interaction and as a prophylactic treatment option for osteoporosis. These porous microspheres are a potential platform technology with applications outside of the medical field (i.e. water purification) and we are keen to work with others to explore these and other alternate applications for these novel materials.

Topics in which you would like to develop collaborative research:

We are keen to work with groups with strong experience in pre-clinical (animal) trials, especially with osteoporosis animal models. We also want to explore incorporation of alternate biological factors into the microspheres and their effects of regenerating bone and cartilage tissues. We are also keen on exploring these materials for regeneration of other sift tissue (i.e. liver) and for drug delivery applications.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Include here any relevant collaborations you have
China: UNNC (University of Nottingham, Ningbo campus), Sinoma Ltd (Nanjing).
UK: Bradford, Leeds, Sheffield, Newcastle, UCL and others.
EU: Åbo Akademi Process Chemistry Centre, Finland: Instituto de Cerámica y Vidrio, Spain.
USA: Virginia Tech. **Clinical**: Queens Medical Centre, Nottingham University Hospitals.

Relevant graphics, figures, pictures:
Use this area to show pictures or scientific figures which illustrate your research

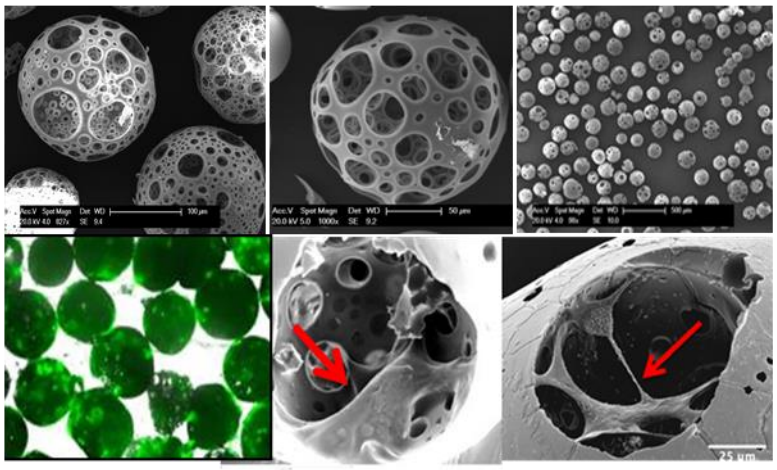


Figure 1: **Patent filed porous glass microsphere technology based on controlled porosity of inorganic microspheres with interconnected porosity (above images reveal that up to 80% porosity can be achieved within each microsphere). Recent feasibility studies show stem cells colonised on and within the microspheres (see bottom images with red arrows – *Unpublished data*).**

Publications and other outputs relevant to your interest in this programme (up to 5)
Please give references to your key recent research publications

1. K.M.Z Hossain, Uresha Patel and Ifty Ahmed. Development of Microspheres for Biomedical Applications: A Review. Progress in Biomaterials. March 2015, Volume 4, Issue 1, pp 1-19.
2. Ifty Ahmed, Sharifah Syed Shaharuddin, Nusrat Sharmin, David Furniss and Chris Rudd. Core/Clad Phosphate Glass Fibres Containing Iron and/or Titanium. Biomedical glasses. Vol 1, Iss 1, ISSN (Online) 2299-3932, DOI: 10.1515/bglass-2015-0004, July 2015.
3. Stuart, Bryan; Gimeno-Fabra, Miquel; Segal, Joel; Ahmed, Ifty and Grant, David. Degradation and Characterisation of Resorbable Phosphate-Based Glass Thin Film Coatings Applied by RF magnetron Sputtering. 2015. ACS applied materials & interfaces 7 (49), 27362-27372. Dec 2015. doi: 10.1021/acsami.5b08957.
4. Nusrat Sharmin, Muhammad S. Hasan, Andrew J. Parsons, Chris D. Rudd and Ifty Ahmed. Cytocompatibility, mechanical and dissolution properties of high strength boron and iron oxide phosphate glass fibre reinforced bioresorbable composites, Journal of Mechanical Behaviour of Biomedical Materials. Volume 59, June 2016, Pages 41–56.
5. Menghao Chen, Reda Felfel, Andrew parsons, Chris Rudd, Derrek Irvine and Ifty Ahmed. In-situ Polymerisation of Fully Bioresorbable Polycaprolactone/Phosphate Glass Fibre Composites: In Vitro Degradation and Mechanical Properties. Journal of the Mechanical Behavior of Biomedical Materials. Volume 59, June 2016, Pages 78–89.

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: Ailing Li

Position Assistant researcher**:**

Institute/division: Institute of Chemistry, Chinese Academy of Sciences/ Polymer Physics and Chemistry

Email: liailing@iccas.ac.cn

Tel: 010-82618476

SUMMARY OF MY RELEVANT RESEARCH AREAS: 7 years

Brief summary of your research areas, in English *just a short paragraph please*

Research on biomedical materials, and Polymer physics and Chemisty.

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

1. 高分子物理与化学
2. 生物医用材料

Primary Research interests: *A fuller description of your main research areas.*

1. Sol-Gel bioactive glasses
2. Polymer/bioactive glasses composites
3. Organic/inorganic hybrids

Topics in which you would like to develop collaborative research:

Please indicate here research areas for which you would like to find partners to undertake joint research.

Biomedical materials that can be used in bone and dental areas

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

Include here any relevant collaborations you have

1. Peking University Third Hospital
2. Peking University Hospital of Stomatology

Relevant graphics, figures, pictures:

Use this area to show pictures or scientific figures which illustrate your research

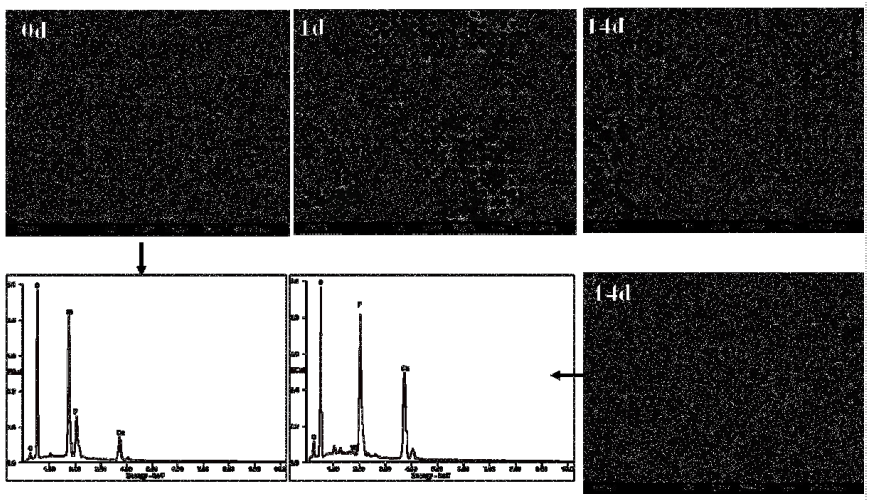


Figure 1 Apatite formation on the surface of the bioactive glasses after immersed in SBF for different times:

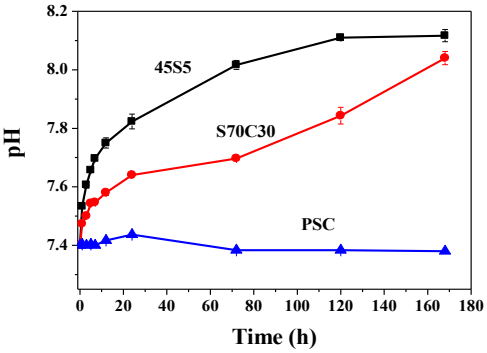


Figure 2 PSC with stable pH value in SBF comparing with conventional glasses (45S5 and S70C30):

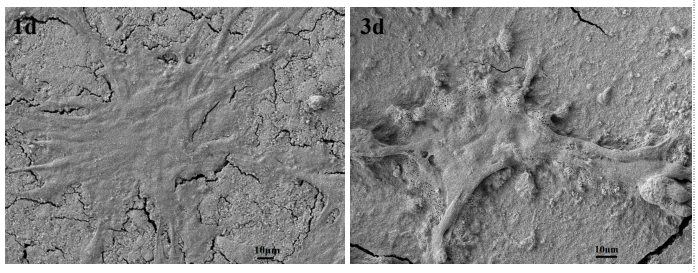


Figure 3 SEM images of preosteoblast MC 3T3-E1 cells cultured on PSC disks for different times (1 day and 3 days)

Publications and other outputs relevant to your interest in this programme (up to 5)

Please give references to your key recent research publications

1. **Ailing Li**，Hong Shen，Huihui Ren，Chen Wang，Decheng Wu，Richard A. Martin(*)，Dong Qiu(*)，Bioactive organic/inorganic hybrids with improved mechanical performance，Journal of Materials Chemistry B，2015，3（7）：1379-1390.

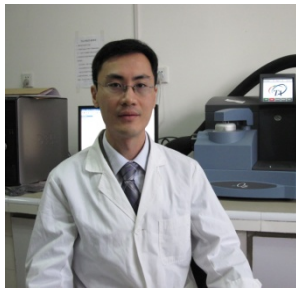
2. Chen Wang，Hong Shen，Ye Tian，Yue Xie，**Ailing Li**(*)，Lijun Ji，Zhongwei Niu，Decheng Wu，Dong Qiu(*)，Bioactive Nanoparticle-Gelatin Composite Scaffold with Mechanical Performance Comparable to Cancellous Bones，Acs Applied Materials & Interfaces，2014，6（15）：13061-13068.

3. Chen Wang，Yue Xie，**Ailing Li**(*)，Hong Shen，Decheng Wu，Dong Qiu(*)，Bioactive Nanoparticle through Postmodification of Colloidal Silica，Acs Applied Materials & Interfaces，2014，6（7）：4935-4939.

4. **Ailing Li**，Dong Qiu(*)，Phytic acid derived bioactive $CaO-P_2O_5-SiO_2$ gel-glasses，Journal of Materials Science-Materials in Medicine，2011，22（12）：2685-2691.

5. Yang Lv，**Ailing Li**，Fang Zhou(*)，Xiaoyu Pan，Fuxin Liang，Xiaozhong Qu，Dong Qiu(*)，Zhenzhong Yang(*)，A Novel Composite PMMA-based Bone Cement with Reduced Potential for Thermal Necrosis，ACS Applied Materials & Interfaces，2015，7（21）：11280-11285.

Research Profile



Name: Jianshu Li

Position: Professor
Institute/division: College of Polymer Science and Engineering
Email: jianshu_li@scu.edu.cn
Tel: 86-28-85466755

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

Synthesis and characterization of biomedical polymers, including protein drug delivery systems, and biomaterials for dental applications. Develop medical devices based on above biomaterials.

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

生物医用高分子材料的合成与表征，包括蛋白质药物控释体系，以及牙科用高分子材料。并基于上述研究开发适用于临床的医疗器械。

Primary Research interests:

1) I'm very interested in the therapy of Diabetes and bone-related diseases such as osteoporosis. These diseases are treated by protein drugs such as insulin and calcitonin. However, the clinic applications of protein/peptide drugs have been restricted by various limitations such as physical and chemical instability, low oral bioavailability, susceptibility to enzymatic degradation, and short in vivo half-lives. In my group, we designed various delivery systems for protein therapy.

2) Dental caries, acidic erosion and dental hypersensitivity are common oral health problems. However, all the current therapy methods are not due to the unsatisfied interface binding force between dental restorative materials and natural tooth. We prepared a series of dental restorative materials based on dendritic polymers bioinspired from noncollagenous proteins or salivary acquired pellicle.

Topics in which you would like to develop collaborative research:

1) Stimuli-sensitive drug delivery system, especially for protein drug.

2) Restorative biomaterials for tooth and bone.

3) Technology about new medical devices.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

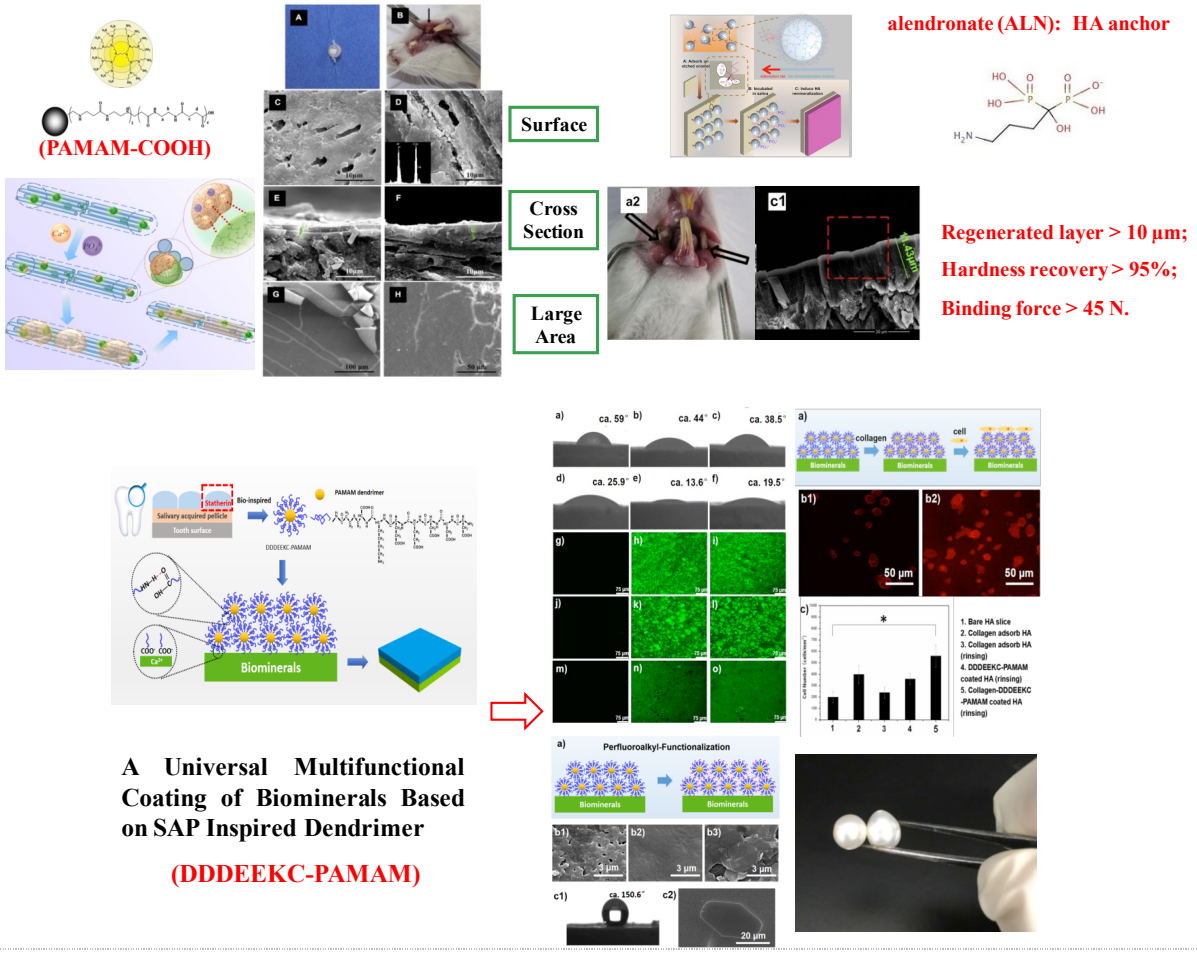
Inside China:

With Zhejiang University, Beijing University of Chemical Technology , and West China Hospital.

Outside China:

With University of New Brunswick in Canada, and Kumamoto University in Japan.

Relevant graphics, figures, pictures:



Publications and other outputs relevant to your interest in this programme (up to 5)

1) Wu, W., Wang, W., **Li, J.,*** Star polymers: Advances in biomedical applications. ***Progress in Polymer Science,*** 2015, 46, 55-85.

2) Wu, D., Yang, J., Li, J., Chen, Li., Tang, B., Chen, X., Wu, W., **Li, J.,*** Hydroxyapatite-anchored dendrimer for in situ remineralization of human tooth enamel. ***Biomaterials,*** 2013, 34, 5036-5047.

3) Li, J., Yang, J., Li, J., Chen, L., Liang, K., Wu, W., Chen, X., **Li, J.,*** Bioinspired intrafibrillar mineralization of human dentine by PAMAM dendrimer. ***Biomaterials,*** 2013, 34, 6738-6747.

4) Luo, J., Cao, S., Chen, X., Liu, S., Tan, H., Wu, W., **Li, J.,*** Super long-term glycemic control in diabetic rats by glucose-sensitive LbL films constructed of supramolecular insulin assembly. ***Biomaterials,*** 2012, 33, 8733-8742.

5) Chen, X., Wu, W., Guo, Z., Xin, J., **Li, J.,*** Controlled insulin release from glucose-sensitive self-assembled multilayer films based on 21-arm star polymer. ***Biomaterials,*** 2011, 32, 1759-1766.

Research Profile

Name: Thomas Paterson
Position: Research Associate
Institute/division: School of Clinical Dentistry, MeDe Innovation, University of Sheffield
Email: t.paterson@sheffield.ac.uk
Tel: 00441142265474

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Electrospinning of polymers with the incorporation of microfeatures. Additive manufacturing using polymer extruders, bioprinting and stereolithography. Creation of STL files and data handling of CT scans into printable objects. Highly porous microsphere production (polyHIPE) utilising microfluidics. Microfluidics manufacturing using direct laser write stereolithography. Vascularisation studies including chorioallantoic membrane (CAM) assays. Injectable materials and cell carriers. Mesenchymal stem cell (MSC) differentiation and characterisation.

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

Primary Research interests:

1) Influencing stem cell fate: The manufacture of electrospun fibre membranes containing microfeature to influence cell behaviour. The investigation of musculoskeletal applications for these electrospun membranes is the main focus for this novel technology. In addition, work on neuronal, cartilage and skin tissues is also ongoing utilising this technology.

2) Bioprinting: Additive manufacturing and bioprinting of tissue engineering scaffolds. Work on cleft pallet repair, the production of synthetic vasculature and the production of microfluidic devices.

3) Antimicrobial wound dressings: The production of anti-microbial chronic ulcer dressings utilising electrospinning incorporating antimicrobial agents.

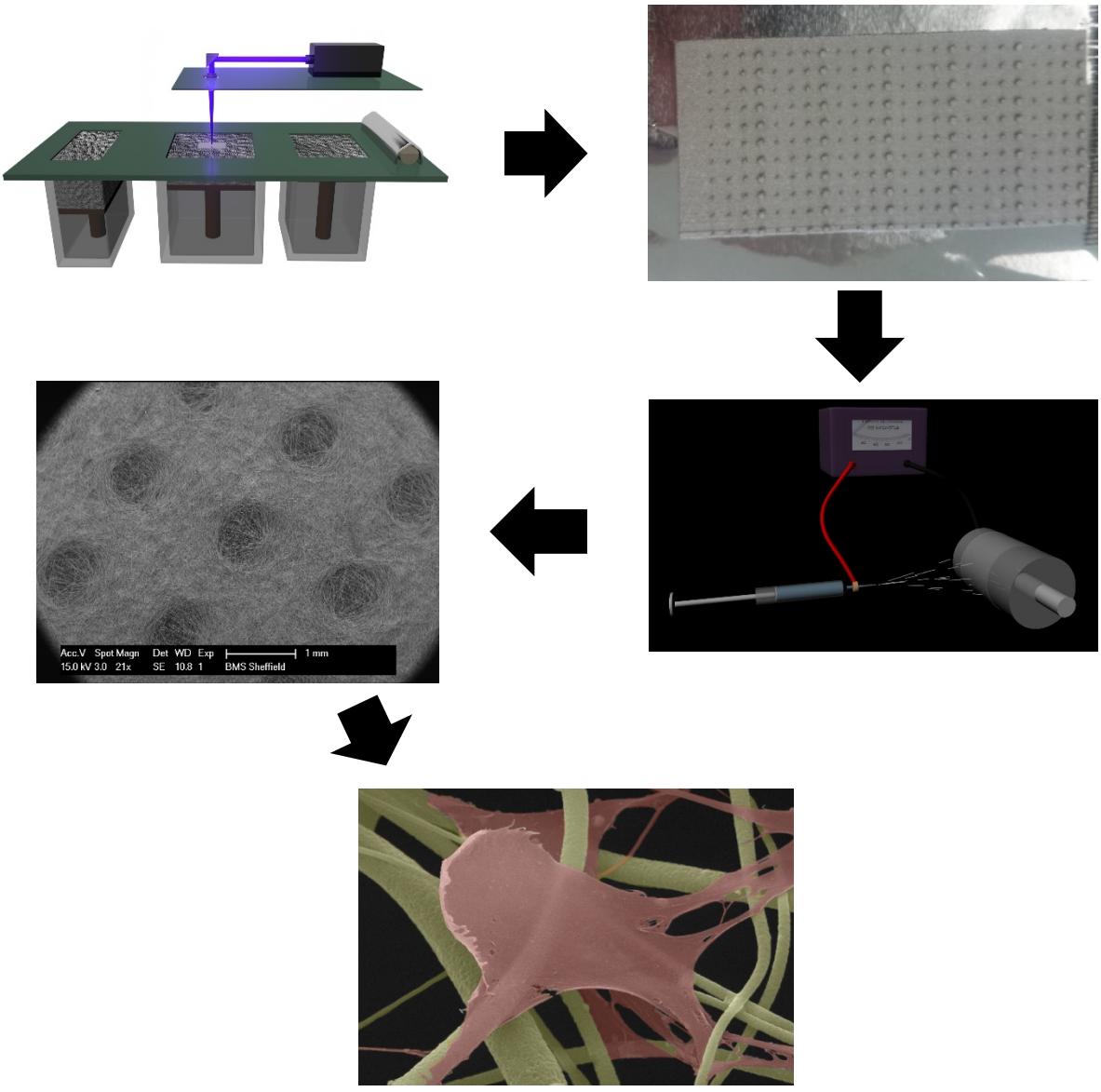
Topics in which you would like to develop collaborative research:

1) We are keen to find new collaborations with groups that would be interested in using the specialised electrospun membranes we produce for a new application/target tissue.

2) To find collaboration on new inks to use for our soft tissue bioprinting.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
China: Collaboration with Dr AJ Wang (王爱娟) from Xi'an University of Technology.
UK: MeDe Innovation: Leeds, Newcastle, Nottingham and Bradford.

Relevant graphics, figures, pictures:



Publications and other outputs relevant to your interest in this programme

"Osteosarcoma growth on trabecular bone mimicking structures manufactured via laser direct write". A Malayeri, C Sherborne, T Paterson, S Mittar, I Ortega, P Hatton, F Claeyssens. International journal of bioprinting. 2016.

"Photocurable high internal phase emulsions (HIPEs) containing hydroxyapatite for additive manufacture of tissue engineering scaffolds with multi-scale porosity". AJ Wang, T Paterson, R Owen, C Sherborne, J Dugan, JM Li, F Claeyssens. Mater Sci Eng C Mater Biol Appl. 2016.

"Emulsion Templated Scaffolds with Tunable Mechanical Properties for Bone Tissue Engineering" Robert Owen, Colin Sherborne, Thomas Paterson, Nicola H Green, Gwendolen C Reilly, Frederik Claeyssens, J Mech Behav Biomed Mater. 2015.

"Combination of Microstereolithography and Electrospinning to Produce Membranes Equipped with Niches for Corneal Regeneration" Í Ortega, F Sefat, P Deshpande, T Paterson, C Ramachandran, AJ Ryan, S MacNeil, F Claeyssens. JoVE. 2014.

Research Profile

Name: Wei Zhang

Position: Associate Professor
Institute/division: Polymer Research Institute at Sichuan Univ.
Email: weizhang@scu.edu.cn
Tel: 13648019293

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

My research focuses on biopolymers, particularly the nanomaterials from renewable resources, such as cellulose nanofibers, chitin whiskers, etc. The extraction of cellulose nanofibers and their applications in green nanocomposites, functional materials and tissue engineering have been the active research topics in my research group.

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

主要从事天然高分子材料的研究，在纤维素纤维增强聚合物复合材料、纤维素纳米纤维的制备和功能化改性应用、纤维素组织工程材料方面取得重要进展。

Primary Research interests: *A fuller description of your main research areas.*

1. *Commercialization of cellulose nanofibers production. The main obstacle for the industrialization of cellulose nanofibers from plant fibers is the vast energy consumption. We have developed an efficient pretreatment technology together with a self designed equipment that can significantly reduce the energy consumption.*
2. *Application of cellulose nanofibers. We have surface-modified the nanomaterials targeting the interfacial and dispersion problems in composites and a series of high performance nanocomposites have been prepared. We also use cellulose nanofibers for some advanced applications, such as paper electronics, energy storage materials, water purification materials as well as biomedicines.*
3. *Electrospinning of cellulose. The electrospinning of native cellulose has been extensively studied in our research group. The electrospun cellulose has been successfully applied in tissue engineering, drug delivery and water purifications, etc.*
4. *3D printing. We have self-developed the first equipment in China that can continuously 3D print objects at a very fast speed with photocurable resins (These print speeds allow parts to be produced in minutes instead of hours). The application of this technique for biomedical application is currently under investigation.*

Topics in which you would like to develop collaborative research:

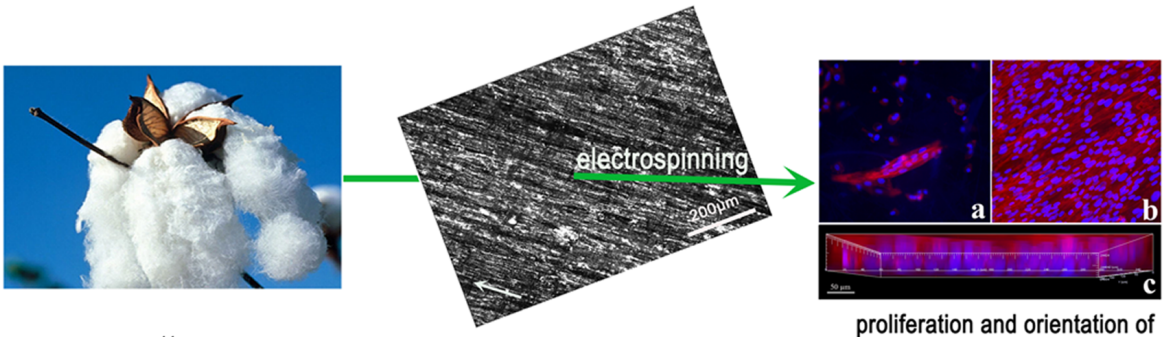
Please indicate here research areas for which you would like to find partners to undertake joint research.

The application of nanocellulose in biomedical research
High-speed continuous 3D printing with photocurable resins and its applications

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Include here any relevant collaborations you have

We have established solid collaborations with the West China Hospital of Stomatology, Sichuan University

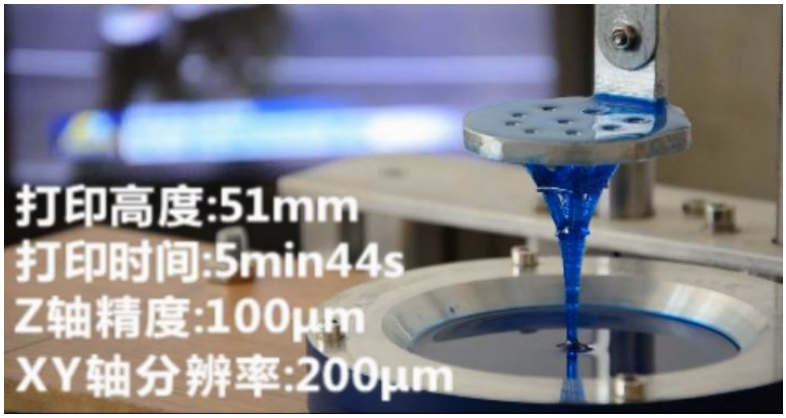
Relevant graphics, figures, pictures:
Use this area to show pictures or scientific figures which illustrate your research



cotton

proliferation and orientation of fibroblast cells on ECCNN scaffolds

Electrospun cellulose nanofibers have been proved to be an ideal scaffold for tissue engineering



We have patented the first 3D printer in China that can print an object of 51mm with less than 6 min

Publications and other outputs relevant to your interest in this programme (up to 5)
Please give references to your key recent research publications

Uniaxially Aligned Electrospun All-Cellulose Nanocomposite Nanofibers Reinforced with Cellulose Nanocrystals: Scaffold for Tissue Engineering，Biomacromolecules，2014，15（2）：618-627。

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: Natacha Rodrigues

Position: PhD researcher
Institute/division: School of Systems and Mechanical Engineering
Email: n.rodrigues2@ncl.ac.uk
Tel: (00)447985155432

SUMMARY OF MY RELEVANT RESEARCH AREAS:

1) *Polymers, glass-ceramics and composites*
2) *Bone and cartilage (osteochondral unit) bio engineering*
3) *Innovative manufacturing routes and customized medical devices.*

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

Primary Research interests:

Manufacture (1) and **Characterisation (2)** of different materials suitable for bone & cartilage tissue engineering.

1) **Manufacturing** routes that are related with additive manufacturing techniques (preferentially combination of them): I have worked with Fused deposition modelling (FDM), binder jetting 3D printing and filament (polymer and composites extrusion);

2) **CAD/CAM :** inventor Autodesk (independent user)

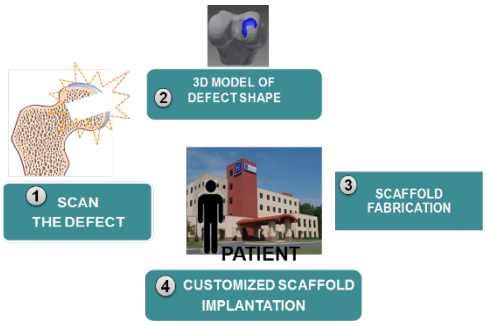
3) **Characterisation** of polymers and Glass-ceramics:
   A) Thermal properties (DSC, TGA, DTA and TGA-MS),
   B) Surface, particle size distribution ,morphology, porosity, chemical composition and crystallinity : SEM-EDX, Micro-CT, XRD, GPC and Laser diffraction (Mastersizer),
   C) In vitro bioactivity and degradation studies ,
   D) Mechanical properties of scaffolds that match bone (trabecular and cortical): tensile and compression tests.

Topics in which you would like to develop collaborative research:

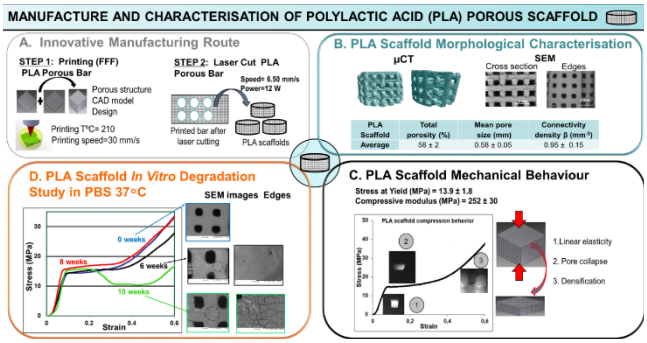
1. Additive manufacturing and/or innovative routes that allow in clinic manufacturing/ micro factories of medical devices (class III);
2. Hybrid composites that match osteochondral unit requirements;
3. Product R&D and market approval (from academia to industry).

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
United Kingdom PARTNERS: Bradford University, Leeds University, Nottingham University and Sheffield University. Materialise and GTS (glass technology services company)

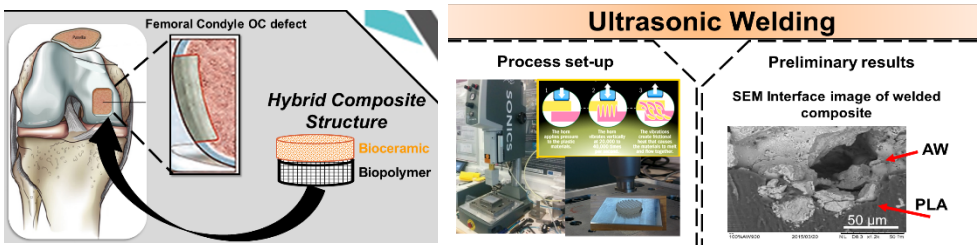
Relevant graphics, figures, pictures:
Use this area to show pictures or scientific figures which illustrate your research



In-clinic Manufacture concept



PLA scaffold (trabecular bone analogue)

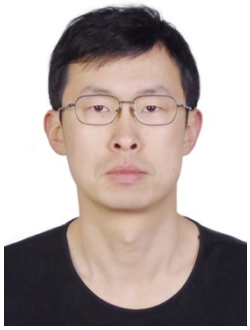


Hybrid composite concept and preliminary results

Publications and other outputs relevant to your interest in this programme (up to 5)

Rodrigues N, Benning M, Ferreira AM, Dixon L, Dalgarno K. *Manufacture and Characterisation of Porous PLA Scaffolds.* Procedia CIRP 2016, 49: 33-38
Doi: http://dx.doi.org/10.1016/j.procir.2015.07.025

Research Profile



Name: Shun Duan
Position: Lecturer
Institute/division: Beijing University of Chemical Technology
Email: duanshun@mail.buct.edu.cn
Tel: +86-18600458769

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

Surface modification; Antibacterial; Gene delivery; Bone tissue engineering; Additive manufacture

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

表面修饰；抗菌；基因载体；骨组织工程；增材制造

Primary Research interests: *A fuller description of your main research areas.*

Surface modification for functionalization of biomedical materials: With the ageing of the population, the morbidity of many degenerative diseases, such as osteoporosis, is increasing in recent years. Bone fracture and defect are common complications of osteoporosis, which need implants for therapy. In the therapeutic process, infection is a major problem leading to treatment failure, especially for the ageing people with low immunity. To solve this problem, we are working on functionalized biomedical implants to enhance their antibacterial and osteogenic properties, which is based on our previous work on surface modification. For this purpose, we are developing a series of surface-modified biomedical materials, including CaP scaffolds, Ti implants, etc. Various functional polymer brushes are constructed on the surface of implants, and bioactive molecules are incorporated to the polymer brushes to improve the biological performance of the implants. By our research, it's promising to develop novel biomedical materials for the effective therapy of degenerative diseases of ageing people.

Topics in which you would like to develop collaborative research:

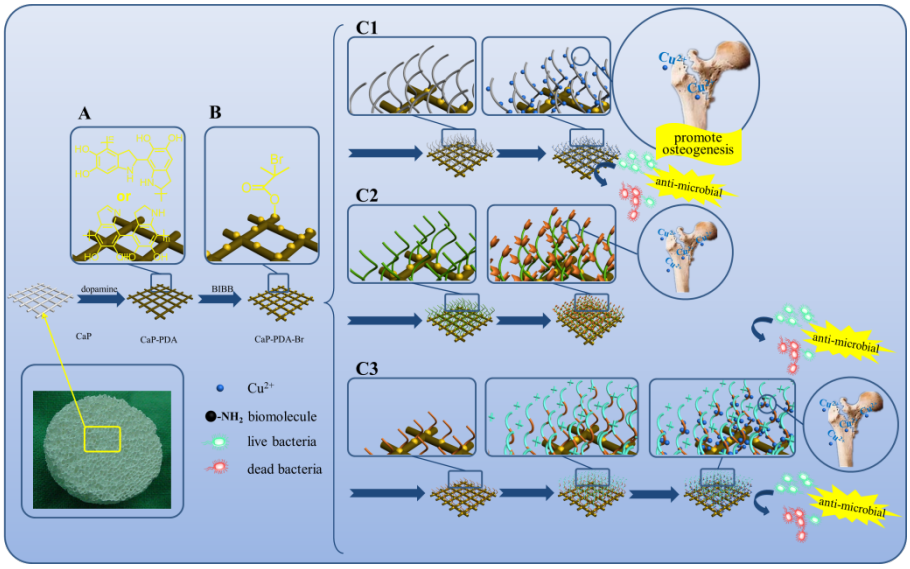
Please indicate here research areas for which you would like to find partners to undertake joint research.

We intend to seek collaboration in the research areas of surface modification of biomedical materials for antibacterial and bone regeneration to promote the healthcare of ageing people.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Include here any relevant collaborations you have

We currently have collaborations with The Institute of Traumatology and Orthopaedics, Beijing Jishuitan Hospital for antibacterial functionalization of CaP scaffold (supported by key project of Beijing Natural Science Foundation, Grant No.: 7161001) and Zhejiang University for surface modification of biomedical materials (supported by National Key Research and Development Plan, Ministry of Science and Tchnology of the People's Republic of China, Grant No.: 2016YFC1100404)

Relevant graphics, figures, pictures:
Use this area to show pictures or scientific figures which illustrate your research



Publications and other outputs relevant to your interest in this programme (up to 5)
Please give references to your key recent research publications

(1) **Shun Duan**, Bingran Yu, Chunxiao Gao, Wei Yuan*, Jie Ma, Fu-Jian Xu*, A facile strategy to prepare hyperbranched hydroxyl-rich polycations for effective gene therapy. *ACS Appl. Mater. Interfaces,* **2016,** Article ASAP, DOI: 10.1021/acsami.6b11029.
(2) Miao Qi[1], **Shun Duan**[1], Bingran Yu, Hao Yao, Wei Tian*, Fu-Jian Xu*, PGMA-based supramolecular hyperbranched polycations for gene delivery. *Polym. Chem.,* **2016**, 7, 4334.
(3) Yu Zhao[1], **Shun Duan**[1], Bingran Yu*, Fu-Sheng Liu, Gang Cheng, Fu-Jian Xu*. Gd(III) ion-chelated supramolecular assemblies composed of PGMA-based polycations for effective biomedical applications. *NPG Asia Mater.,* **2015**, 7, e197.
(4) **Shun Duan**, Shiqing Ma, Zhaohui Huang, Xu Zhang, Xiaoping Yang, Ping Gao, Meizhen Yin*, Qing Cai*. Visualization of in vivo degradation of aliphatic polyesters by a fluorescent dendritic star macromolecule. Biomed. Mater., **2015**, 10, 065003.
(5) Shun Duan, Xiaoping Yang, Fang Mei, Yan Tang, Xiaoli Li, Yuzhou Shi, Jifu Mao, Hongquan Zhang, Qing Cai. Enhanced osteogenic differentiation of mesenchymal stem cells on poly(L-lactide) nanofibrous scaffolds containing carbon nanomaterials. *J. Biomed. Mater. Res. Part A,* **2015,** *103*, 1424.

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: Dr Maria Katsikogianni

Position: Lecturer of Biomaterials Chemistry
Institute/division: University of Bradford/Chemistry
Email: M.Katsikogianni@gmail.com
Tel: 0044 (0) 01274236185

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

Biomimetic design of multifunctional materials to prevent bone infections. Cell/bacteria-material interactions and effect of biomaterial surface chemistry, topography and mechanical stimuli on bacterial adhesion and biofilm formation.

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

Primary Research interests: *A fuller description of your main research areas.*

I am an active member of the Biomaterials research community with a great interest in medical device associated infections. My research profile lies at the interface of biomaterial science, engineering and life sciences. I am particularly interested in the biomimetic design of multifunctional materials for relevant clinical applications, e.g. in the context of engineering and testing non-fouling/antimicrobial materials to prevent bone infections. Through patterning at the sub-micron level and the incorporation of antimicrobial agents, a combined physical and chemical strategy is harnessed for the preparation of medical device surfaces that prevent microbial colonisation without affecting cell adhesion and viability. Enhanced pre-clinical simulation and therefore testing under relevant *in vivo* mimicking conditions informs the design and manufacturing of new materials.

Topics in which you would like to develop collaborative research:

Please indicate here research areas for which you would like to find partners to undertake joint research.

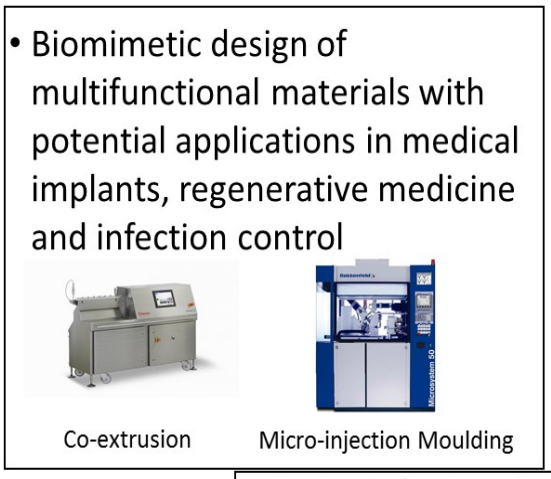
I am keen to find partners in the following areas:

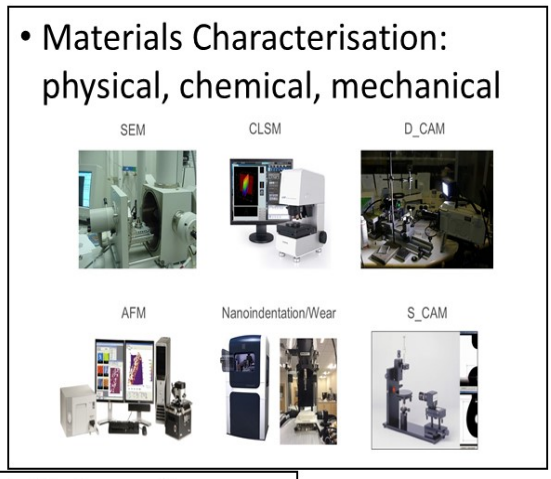
- Novel antimicrobials and their incorporation into polymers in a continuous process
- Functional coatings development and characterisation
- *In vitro* testing and animal studies

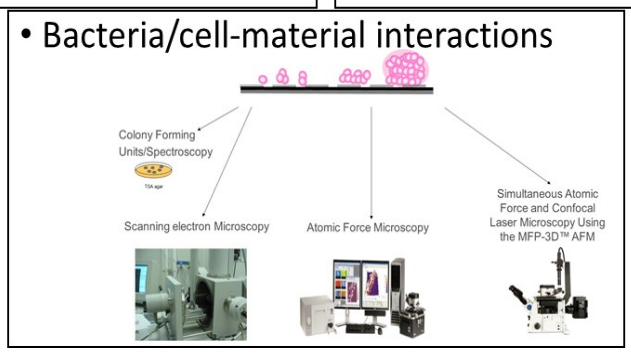
Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Include here any relevant collaborations you have

Polymer IRC; EU COST Action TD 1305; Improved Protection of Medical Devices Against Infection (IPROMEDAI); Prof Peter Giannoudis, Professor and Chairman within Academic Department of Trauma and Orthopaedic Surgery, Leeds General Infirmary; Dr Alan Horner, Smith & Nephew

Relevant graphics, figures, pictures:
Use this area to show pictures or scientific figures which illustrate your research







Publications and other outputs relevant to your interest in this programme (up to 5)
Please give references to your key recent research publications

1. Physicochemical and antibacterial characterisation of a novel fluorapatite coating. Al-Hilou A., Do T., Mizban L., Clarkson B.H., Wood D.J. **Katsikogianni M.G.*** ACS Omega 2016; 1(2): 264-276.
2. Biomaterial functionalized surfaces for reducing bacterial adhesion and infection. **Katsikogianni M.G.**, Wood D.J., Missirlis Y.F. Handbook of Bioceramics and Biocomposites, Springer published January 2016, pp 1-28.
3. Assessing Probable Mechanisms of Bacterial Adhesion to Biomaterial Surfaces. **Katsikogianni M.G.**, Missirlis Y.F. Accepted by Encyclopedia of Surface and Colloid Science, 3nd Ed, Taylor and Francis, 2015.
4. Cell vs. bacterial viability in the presence of host defence peptides and RGD. **Katsikogianni M.G.**, Hancock R.E.W., Devine D.A., Wood D.J. European Cells and Materials 2015; 30(2): 55.
5. Bioflavonoid Coated Materials. Thomas H., Dowling D.P., **Katsikogianni M.G.** Patent publication numbers GB2505248 and WO2014030005 A1, 2014.

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: **Yang Li**

Position: **Lecturer**

Institute/division: **College of Materials Science and Engineering, Beijing University of Chemical Technology**

Email: **ly@mail.buct.edu.cn**

Tel: **010 - 64421243**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Building nanostructures using living radical polymerization, Multifunctional nanoparticles for drug delivery and bio-imaging, Polysaccharide based hydrogels for medical applications.

通过活性自由基聚合构建纳米材料，多功能药物控释及示踪纳米载体，多糖基水凝胶医用材料。

Primary Research interests:

Dr. Li did his PhD research on nanoparticles for bio-imaging applications in The University of New South Wales under the supervision of Prof. Thomas Davis and A/Prof. Cyrille Boyer. Then he moved to ARC Centre of Excellence in Convergent Bio-Nano Science & Technology (Monash University) to keep on his research on Nano-medicine. At the moment, Li is a lecturer of Beijing Laboratory of Biomedical Materials, Beijing University of Chemical Technology.

Main research projects include:

Biomaterials for Immunotherapy: Using nano-sized materials to stimulate immune systems.

Biomaterials for Chemotherapy: The designation of advanced drug delivery systems.

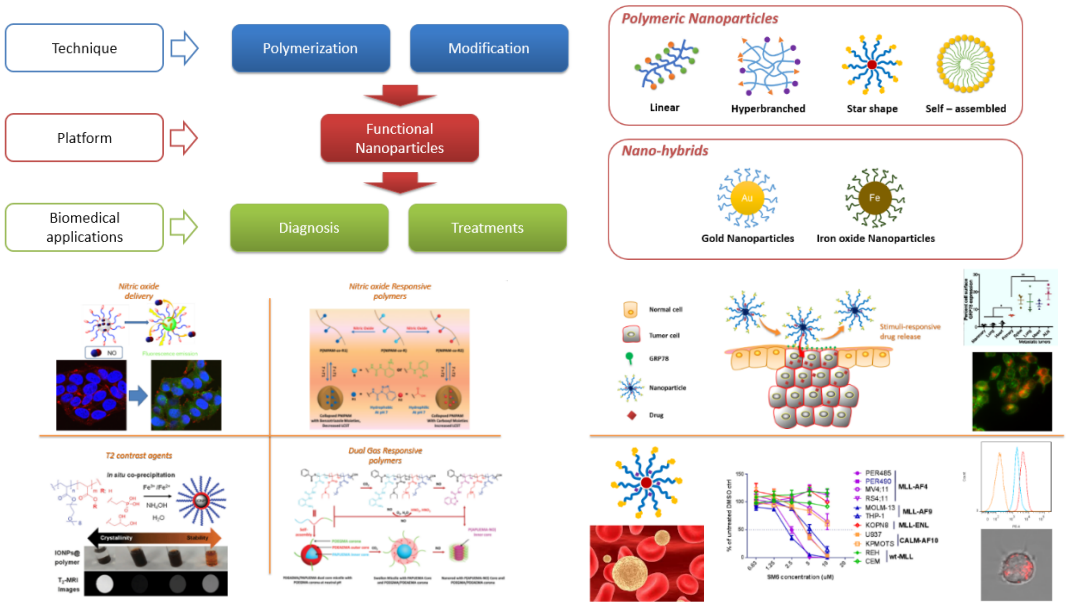
Biomaterials for Wound Dressing: The development of novel dressings for burn wound healing and diabetic foot.

Topics in which you would like to develop collaborative research:

Drug delivery systems, advanced wound dressing

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Australia: The University of New South Wales, Monash University

Relevant graphics, figures, pictures:



Publications and other outputs relevant to your interest in this programme (up to 5)
ARC Discovery Grants DP110104251 (PhD Thesis, Ranked A+)
Title: New polymers for imaging applications
Summary: Cancer and cardiovascular disease are the most devastating diseases in any developed country. This project describes improved imaging agents to improve the detection and earlier treatment of diseases whilst avoiding any problems with toxicity of imaging agents in the body.

ARC Discovery Grants DP1092640
Title: Polymer Stabilized and Bio-functionalised Metal Nanoparticles as Potential Vectors for Drug Therapies
Summary: The project aims to make novel nanoparticles (extremely small, nano means one billionth of a meter) that carry medicines to very specific sites of the body and then release them. This would result in much improved outcomes for conventional chemotherapy but may also allow new gene therapies where diseases can be silenced at their source.

ARC Discovery Grants DP130100107
Title: Design of multimodal polymeric nanoparticles as targeted carriers for the co-delivery of therapeutic molecules
Summary: This project will greatly enhance the tools available to oncologists by providing new treatment options, minimising side-effects to conventional chemotherapy approaches. In this project, the design of next generation of drug delivery will be developed using the most recent advances in materials sciences.

NSFC 51603008
Title: Novel polysaccharide assemblies as controlled cytokines delivery vectors.

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: **Dr. Farshid Sefat**
Position: **Programme Leader & Lecturer in Medical Engineering**
Institute/division: **University of Bradford, UK**
Email: F.Sefat1@Bradford.ac.uk
Tel: **(00) 441274-23367 / (00) 4478-138-17460**

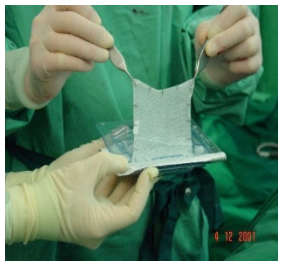
SUMMARY OF MY RELEVANT RESEARCH AREAS:

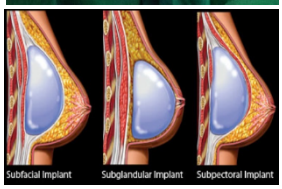
My research is based on developing biomaterials to control cellular behaviour with particular emphasis in developing engineered materials for tissue engineering of bone/cartilage, skin/hair, cornea and blood vessel.

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

Primary Research interests:

Dr. Farshid Sefat is Programme leader and lecturer in Medical Engineering at the University of Bradford and previously he was Head of Biomedical Engineering Department at King Faisal University (Saudi Arabia). He completed his Post Doc at University of Sheffield (UK). He received his Ph.D. (2011) and BEng. (2005) degrees from University of Bradford (UK) both in Biomedical Engineering. He also obtained his MSc. (2006) in Cell and Tissue Engineering from Keele University (UK).





Main Research Projects include:

1. Skin/Hair Tissue Engineering:
- Optimisation of layer-by-layer 3D scaffold for dermal wound healing
- Formation of hair follicle using 3D biomimetic nanofibers constructs

2. Cornea Tissue Engineering:
- Fabrication and characterisation of biodegradable scaffolds for cornea tissue engineering

3. Bone/Cartilage Cell Engineering:
- Effect of cannabinoids in wound healing of bone and cartilage cell monolayer
- Cell signalling pathways of Transforming Growth Factor Beta (TGF-β isomers)
- Fabrication and characterisation of hydrogels for cartilage repair

4. Vascular Tissue Engineering:
- Fabrication and characterisation of Electrospun polymer for vascular tissue engineering

5- Breast Reconstruction:
- Functional composite scaffold for local drug delivery in situ postoperatively in breast cancer patients

6. Electrospun Nanofibers for Dental Applications
- Histatin Peptides: Types, Function and it's Applications in Bio-Dental Research

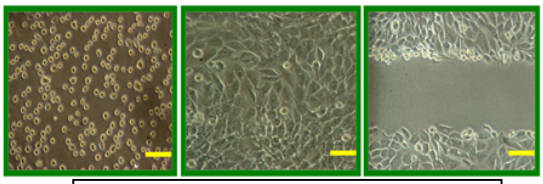
Topics in which you would like to develop collaborative research:

a) Fabrication/Charactrisation of novel vascular graft
b) Biomaterials fabrication & characterization for soft and hard tissue
c) Optimisation of thermosensitive hydrogels for cartilage repair
d) Investigate the effect of mechanical stimulation for chondrocyte repair
e) Suitable polymeric electrospun scaffold for breast cancer treatment

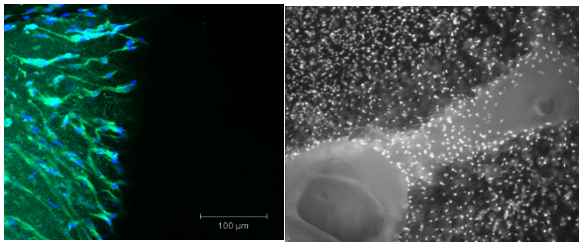
Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

USA – Stevens Institute of Technology	(Skin and Hair Tissue Engineering)
UK – Neotherix	(Electrospun Scaffold for Breast Cancer Treatment)
UK – University of Manchester	(Electrospun Scaffold for Vascular Graft)
Malaysia - Universiti Tun Hussein Onn	(Bone and Cartilage Cell Engineering)
India – LV Prasad Eye Institute	(Biomaterials Fabrication for Cornea Tissue Eng.)
Saudi Arabia – King Faisal University	(Optimisation of Electrospun Scaffold for Skin repair)

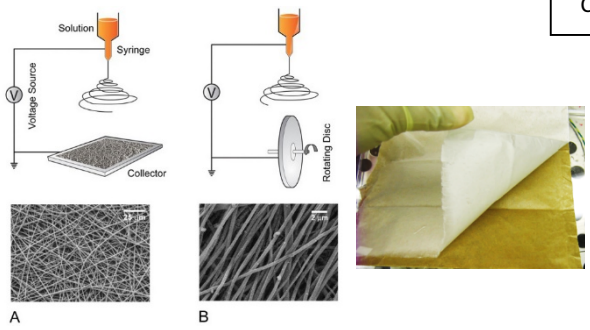
Relevant graphics, figures, pictures:



Wound healing of bone cell monolayer



Cornea explant outgrowth in cells from explants



Electrospinning of polymers for Tissue Engineering applications

Cytotoxicity test – PLGA scaffold on Rabbit cornea

Electrospun PCL/Coll nanofibers for full thickness wound repair

Regeneration of Hair Follicle-like Structures within 3D Biomimetic Nanofiber

Publications and other outputs relevant to your interest in this programme

1. **SEFAT F**, MAHJOUR B, POLUNIN Y, WANG L and WANG L (**2016**): "Improved cell infiltration of electrospun nanofiber mats for layered tissue constructs" *J Biomed Mater Res A*, Wiley.

2. **SEFAT, F.**, YOUSEFFI, M., KHAGHANI, S.A., SOON, C.F., JAVID, F. (**2016**) Effect of Transforming Growth Factor-β3 on mono and multilayer chondrocytes, Cytokines, 83:118-26.

3. MAHJOUR B, FU X, YANG X, **SEFAT F** and WANG H (**2015**): "Rapid creation of skin substitutes from human skin cells and biomimetic nanofibers for acute full-thickness wound repair" *Burns*, Elsevier, **41** (8): 1764–1774.

4. DESHPANDE P, ORTEGA I, **SEFAT F**, SANGWAN V.S. and MACNEIL V.S. (**2015**): "Rocking Media Over Ex Vivo Corneas Improves This Model and Allows the Study of the Effect of Proinflammatory Cytokines on Wound Healing" *Invest Ophthalmol Vis Sci.*, **56** (3): 14-15308.

5. DESHPANDE P, RAMACHANDRAN C, **SEFAT F**, RYAN A.J. and MACNEIL A.J. (**2013**): "Simplifying corneal surface regeneration using a biodegradable synthetic membrane and limbal tissue explants" *Biomaterials*, Elsevier, **34** (21): 5088-106.

Research Profile

Name: Meng Yang

Position: Director of Research & Development Department
Institute/division: Wuxi BioLife Medical Equipment Ltd.
Email: mengyang1987@aliyun.com
Tel: +86 13861841863

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Synthesis and modification of polymers (Polysiloxane, Polyurethan); Preparation of elastomer composites; Computer Modelling and Finite Element Analysis of products; Research and development of artificial cervical disc product; Spinal biomechanics.

聚合物（聚硅氧烷、聚氨酯类）的分子设计、合成与改性；弹性体纳米复合材料的制备；产品的计算机建模及有限元分析；人工颈椎间盘产品的研发；脊柱生物力学的研究。

Primary Research interests:

Dr. Meng Yang graduated from Beijing University of Chemical Technology (BUCT), with PhD research on synthesis, modification and preparation of polymers (elastomers). Now Meng is director of Research & Development Department of Wuxi BioLife Medical Equipment Ltd., which was recently started for the Research & Development of new biomedical products.

Main research projects include:

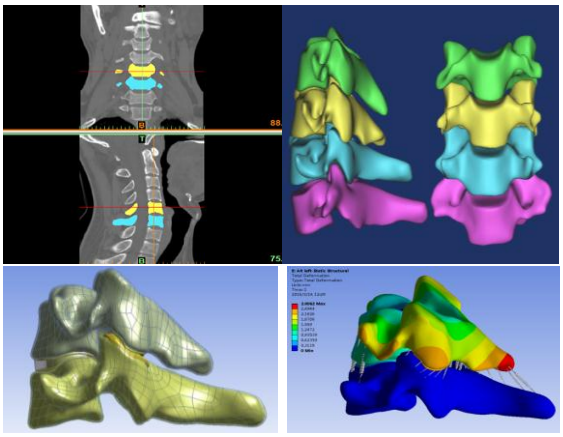
1. With the aging process, the incidence of spinal disease gradually increased. One major research focuses on the design and development of a new artificial cervical disc for cervical disease treatment, the computer modelling of spine and products, the finite element analysis of products, and the effects of the designed cervical disc on spinal motion and biomechanics.
2. Design and synthesis of elastomers for medical applications. One research focuses on the design and synthesis of chemical crosslinked polycarbonate polyurethanes with high mechanical properties, good biocompatibility, high hydrolysis resistance, high fatigue resistance, and very low permanent deformation in compression. The prepared polyurethane can be used in some implants, e.g. artificial cervical disc. Another early research is on the synthesis of polysiloxane with some reactive groups, the grafting some functional substance on the chains of polysiloxane and the preparation of polysiloxane composites through in-situ reaction. These polysiloxanes and their composites include epoxy polysiloxane, polyhedral oligomeric silsesquioxanes/ polysiloxane composites, 2-Hydroxyethyl methacrylate/polysiloxane composites, etc.

Topics in which you would like to develop collaborative research:

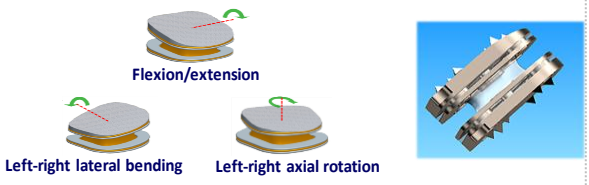
1. Design and development of artificial device for medical applications
2. Research in spine field
3. Design and synthesis of polymers for medical applications

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Center of Advanced Elastomer Materials, Beijing University of Chemical Technology;
Beijing Institute of Traumatic Orthopedics; Jishuitan Hosipital.

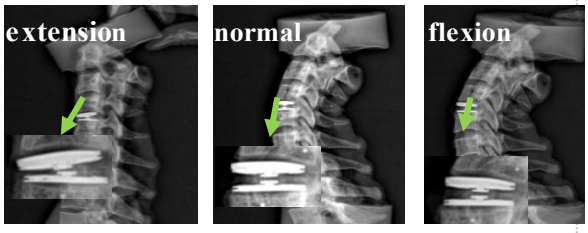
Relevant graphics, figures, pictures:
Use this area to show pictures or scientific figures which illustrate your research



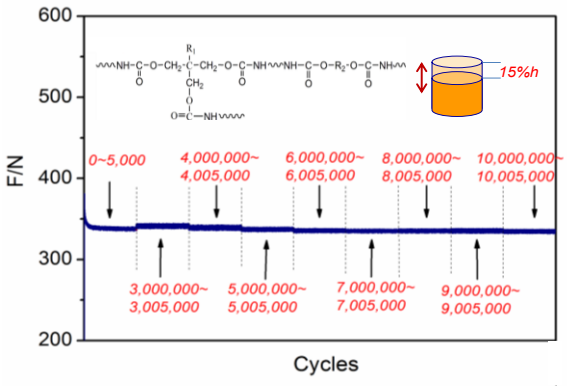
Computer modelling and finite element analysis of cervical vertebra



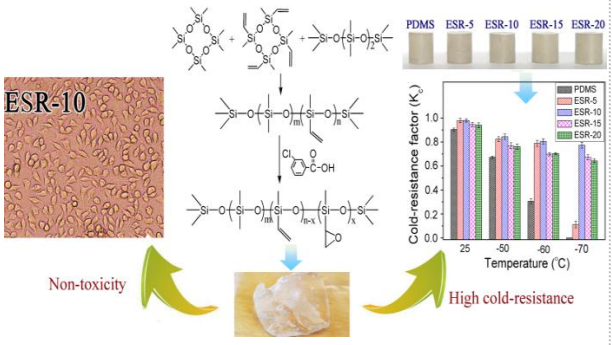
The designed artificial cervical disc



Cadaver vertebral experiment



Synthesized CPU with high fatigue resistance



Synthesis of epoxy polysiloxane

Publications and other outputs relevant to your interest in this programme (up to 5)

1. Meng Y, Wei Z, Liu L, et al. Significantly improving the thermal stability and dispersion morphology of polyhedral oligomeric silsesquioxane/polysiloxane composites by in-situ grafting reaction[J]. Polymer, 2013, 54(12):3055-3064.
2. Meng Y, Chu J, Xue J, et al. Design and synthesis of non-crystallizable, low-Tg polysiloxane elastomers with functional epoxy groups through anionic copolymerization and subsequent epoxidation[J]. Rsc Advances, 2014, 4(59):431-433.
3. Meng Y, Chu J, Liu C, et al. Oil resistance and mechanical properties of polysiloxane nanocomposites prepared by in situ, reaction of reactive polar monomers[J]. Journal of Applied Polymer Science, 2014, 131(21):8558-8572.
4. Meng Y, Lu Y L, Wei Z, et al. Structure, morphology, and mechanical properties of polysiloxane elastomer composites prepared by in situ polymerization of zinc dimethacrylate[J]. Express Polymer Letters, 2012, 6(11):882-894.
5. Zheng W, Lu Y, Yang M, et al. Improved understanding of in-situ polymerization of zinc dimethacrylate: The solid bulk polymerization[J]. Polymer, 2012, 53(6):1409-1417.

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: Dr Karthik Nair

Position: Postdoctoral Researcher
Institute/division: School of Engineering University of Bradford
Email: k.j.nair2@bradford.ac.uk
Tel:(00)441274233648

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English just a short paragraph please

Micro-injection moulding, Pharmaceutical Compounding Oriented Polymers, Solid Phase orientation processing, Polymer Rheology, Pulmonary and Transdermal Drug delivery systems and Particle Engineering.

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

Primary Research interests: *A fuller description of your main research areas.*

Dr Karthik Nair graduated from Bharathi Vidyapeeth College of Pharmacy (Kolhapur, India) with a Bachelor Degree in Pharmacy (2006) he gained PGDip in pharmacology from Nottingham Trent University. He has also gained MSc in drug delivery from Aston University, Birmingham. In 2014 he completed his PhD in Pharmaceutical Engineering from Polymer IRC University of Bradford and since then he is working as a Post-Doctoral Researcher in Medical Devices under Prof Phil Coates and Dr Ben Whiteside.

Main research projects include:

Healthcare: bioresorbable shape memory materials for bone and soft tissue fixation, novel extrusion manufacturing of drugs, drug delivery devices, microneedles and drug eluting implants.

Basic science: Molecular architecture effects on processing, ultra-high strain rate rheometry, AFM of polymers, biomedical materials, tissue and nanocomposites.

Novel & efficient processing: Micro-injection moulding, Ultra sound moulding solid phase orientation processing – die drawing, extrusion quality control and additives compounding

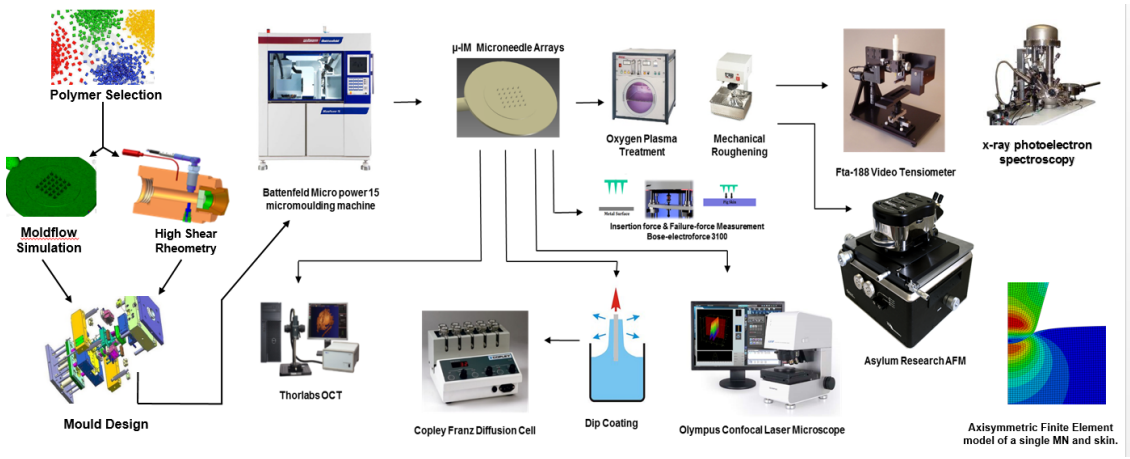
Topics in which you would like to develop collaborative research:

Please indicate here research areas for which you would like to find partners to undertake joint research.

1. Drug eluting devices
2. Extrusion
3. Microneedles
4. Micro-injection moulding
5. Ultrasound moulding
6. Soft tissue fixation
7. Die drawing/solid phase orientation.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Include here any relevant collaborations you have
UK: University of Loughborough, Nottingham University and Cardiff University
India: Indian Institute of Science Bangalore and Institute of Chemical Technology Mumbai.
China: Institute of Applied Chemistry CAS Changchun
Industry: SABIC Netherlands.

Relevant graphics, figures, pictures:
Use this area to show pictures or scientific figures which illustrate your research



Publications and other outputs relevant to your interest in this programme (up to 5)
Please give references to your key recent research publications

Jadhav N and *Nair K*; (2009).Glass transition temperature: Basics and application in pharmaceutical sector. *Asian Journal of Pharmaceutics,* 2(3).p.85-89.

Coates P, Whiteside B, Kelly A and *Nair K*, High strain rate rheometry of polymer melts and nano-composites, The 29th International Conference of The Polymer Processing Society (PPS-29) 2013.

Nair K, Grant C, Whiteside B, Patel R, Norris K & Paradkar A, *Preformulation studies of polymers for microneedle design*; Microneedle 2012, Cork, Ireland.

Nair K, Grant C, Whiteside B, Bobe C, Patel R, Norris K & Paradkar A, Investigation of plasma treatment on polymeric micro-injection moulded microneedle for protein drug delivery, *Pharmaceutics 2015, 7(4), 471-485*

Research Profile

Name: **Xiaowen Zhao**

Position: **Associate professor**

Institute/division: **Polymer Research Institute of Sichuan University**

Email: **zhaoxiaowenscu@126.com**

Tel: **(00) 86 28 85408802**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Oriented self-reinforced polymers; Solid phase processing technology of polymer materials; Structure and blood/bio-compatibility of highly oriented poly(lactic acid) produced by solid hot drawing; Controlled drug release system; Chitosan based intelligent hydrogel

取向自增强高分子材料设计与制备；高分子材料固相加工技术；固相热拉伸技术制备高度取向 PLA 结构及血液/生物相容性；药物可控释放体系；壳聚糖基智能水凝胶

Primary Research interests: *A fuller description of your main research areas.*

Structure and blood/bio-compatibility of highly oriented poly(lactic acid) (PLA)-based materials produced by solid hot drawing: Oriented PLA/polyurethane blends with enhanced blood compatibility; Oriented PLA/MWNTs composites with improved mechanical properties and blood compatibility; Structure and blood compatibility of highly oriented PLA by chain extension; Fibrillation of chain branched PLA with bionic structure; Structure and biocompatibility of long chain branched PLA produced by one/two-dimensional orientation

Controlled drug release system: Preparation and drug release behavior of pH-responsive chitosan microspheres; Synthesis of cationic chitosan hydrogel and its controlled glucose-responsive drug release behaviour; Glucose-responsive drug release behaviour of cationic chitosan hydrogel with long chain alkyl; Chitosan/GO nano-composite hydrogel for controlled pH- and glucose-responsive drug release application

Topics in which you would like to develop collaborative research:

Preparation of PLA bone fixation material through solid hot stretching microfibrillation and its biological properties

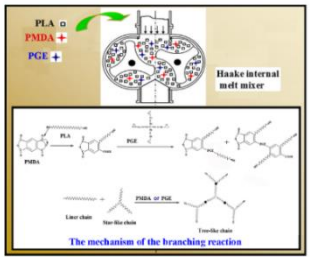
Bone fracture is very common among osteoporotic patients for the aged, and more than half of them require bone implants for fixation. Conventionally, bone implants used for fracture fixation are made of stainless steel, titanium or titanium alloy, which are far harder than osteoporotic fracture bone, and a second operation to remove them after recovery may be required. Poly (lactic acid) (PLA), a linear aliphatic thermoplastic polyester derived from renewable resources, has been approved by the FDA for numerous clinical applications due to its biodegradable and biocompatible nature. This project will focus on the development of self-reinforced PLA as bone fixation materials for aged osteoporosis patients. PLA with strain hardening rheological behavior will be prepared and the solid die drawing technology of PLA will be established to realize the high orientation and microfibrillation, for the purpose of the dramatic enhancement of mechanical properties, promoting the formation of an oriented orderly bionic structure similar to bone collagen fiber, slowing down the molecular degradation and strength decay rate, and controlling the shape memory effect. And thus the PLA bone fixation materials with ideal repair effect of bone defect and excellent biological properties of controllable degradation and self-fastening will be achieved.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

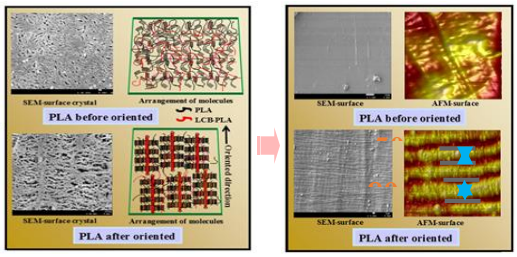
Include here any relevant collaborations you have

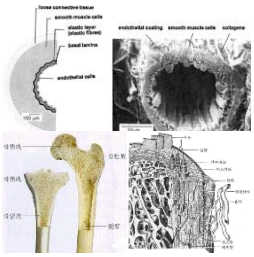
- Sub-project of Science Bridge China project (cooperation with Bradford university)
- International Scientific and Technological Cooperation Project of Sichuan Province (cooperation with Bradford university)

Relevant graphics, figures, pictures:

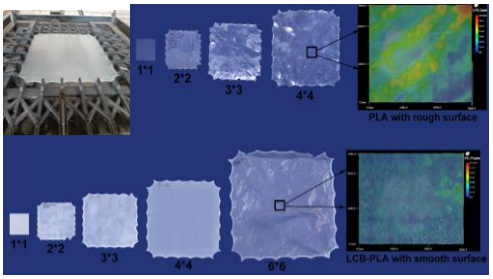


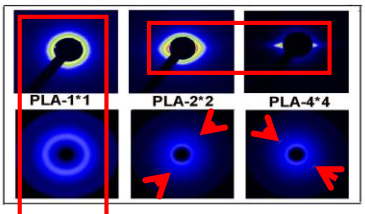
PLA was long-chain-branched by ring-opening reaction through reactive processing



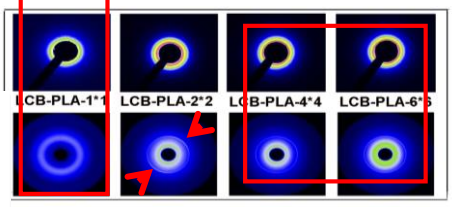


Bionic character of uniaxial oriented LCB-PLA

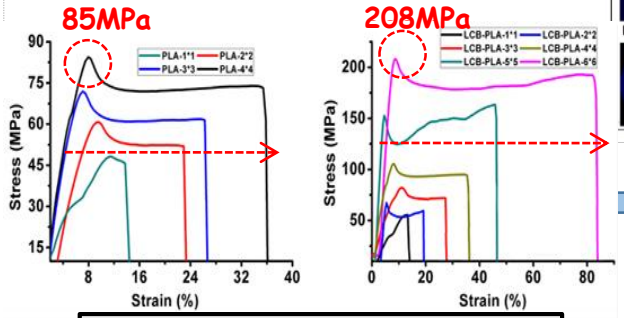




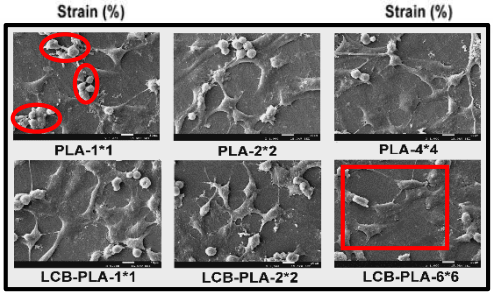
During biaxial orientation, non-uniform deformation occurred for PLA

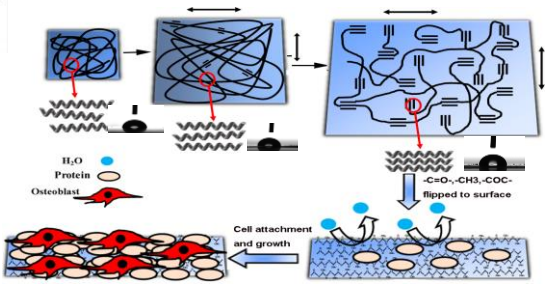


Homogeneous orientation can be observed for LCB-PLA



After biaxial orientation, the mechanical property of LCB-PLA can basically meet the requirement for bone fixation.





Mechanism of enhanced biocompatibility for biaxial oriented LCB-PLA

Publications and other outputs relevant to your interest in this programme (up to 5)

1. Zhengqiu Li, Xiaowen Zhao*, Lin Ye, Phil Coates, Phil Caton-Rose, Michasel Martyn, Chemical Engineering Journal (IF: 4.058), 2015, 279(1):767
2. Zhengqiu Li, Xiaowen Zhao*, Lin Ye, Phil Coates, Fin Caton-Rose, Michasel Martyn, Polymer (IF: 3.766), 2015, 56(15): 523
3. Zhengqiu Li, Xiaowen Zhao*, Lin Ye, Phil Coates, Phil Caton-Rose, Michasel Martyn, Journal of Biomedical Materials Research Part A (IF: 3.263), 2016, 104: 1082
4. Zhengqiu Li, Xiaowen Zhao*, Lin Ye, Phil Coates, Phil Caton-Rose, Michasel Martyn, Journal of Biomaterials applications (IF: 2.764), 2014, 28: 978
5. Zou Xue, Xiaowen Zhao*, Lin Ye, Chemical Engineering Journal (IF: 4.058), 2015, 273: 92

Research Profile

Name: Ankush Aggarwal
Position: National Research Network Research Fellow
Institute/division: Zienkiewicz Centre for Computational Engineering
Email: a.aggarwal@swansea.ac.uk
Tel: 01792-295253

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Computational biomechanics using multi-scale methods, focus on cardiovascular technology. Interested in mechanical characterization of biological and tissue engineered materials.

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

Primary Research interests: *A fuller description of your main research areas.*

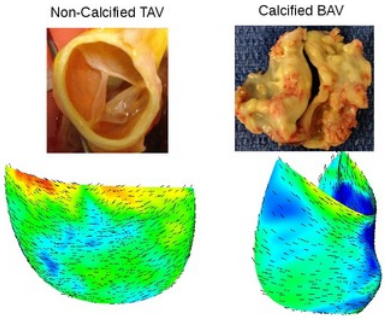
My research interests are at the interface of biology and mechanics with application to healthcare technology, primarily using advanced computational tools and multiscale methods. I am working on identifying and predicting the calcification of aortic valve and ways to emulate the mechanical properties of native valves so as to improve the performance of bioprosthetic ones. I am interested in a particular phenomenon called residual stress or pre-stress, which is present in almost all biological structures. However, its functional role is not entirely clear. I am working on elucidating its function and developing methods to incorporate it into bioprosthetics such that their performance is improved. I am also interested in mechanical characterization of other biological and tissue engineered materials.

Topics in which you would like to develop collaborative research:

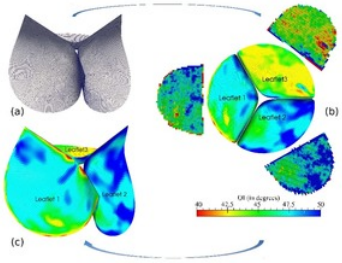
I am looking to complement my computational work with an experimentalist in areas such as tissue engineering, polymer bioprosthetics, and effect of cellular function on the macro scale mechanical properties.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
USA: University of Pennsylvania, University of Texas at Austin, University of Oklahoma
UK: Durham University, King's College London

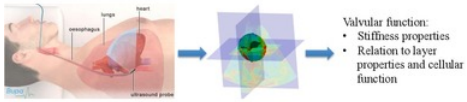
Relevant graphics, figures, pictures:



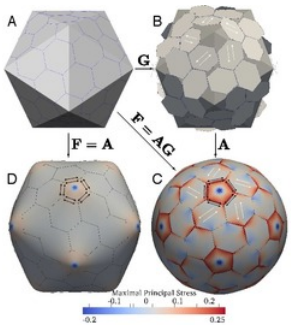
Architecture differences due to congenital valve disease



Computational model of tricuspid valve from patient specific fiber structure



Overall aim: In-vivo identification of valvular function



Conformational changes in protein shell explained by elasticity theory

Publications and other outputs relevant to your interest in this programme (up to 5)

[1] Ankush Aggarwal. An improved parameter estimation and comparison for soft tissue constitutive models containing exponential function. Biomechanics and Modeling in Mechanobiology, (under review)
[2] Ankush Aggarwal, Alison M. Pouch, Eric Lai, John Lesicko, Paul A. Yushkevich, Joseph H. Gorman III, Robert C. Gorman, and Michael S. Sacks. In-vivo heterogeneous func- tional and residual strains in human aortic valve leaflets. Journal of Biomechanics, 49(12):2481 – 2490, 2016. Special Issue on Cardiovascular Biomechanics in Health and Disease
[3] Ankush Aggarwal and Michael S. Sacks. An inverse modeling approach for semilunar heart valve leaflet mechanics: exploitation of tissue structure. Biomechanics and Modeling in Mechanobiology, 15(4):909–932, 2016
[4] Ankush Aggarwal, Giovanni Ferrari, Erin Joyce, Michael J. Daniels, Rachana Sainger, Joseph H. Gorman III, Robert Gorman, and Michael S. Sacks. Architectural trends in the human normal and bicuspid aortic valve leaflet and its relevance to valve disease. Annals of Biomedical Engineering, 42(5): 986–998, 2014
[5] Ankush Aggarwal, Joseph Rudnick, Robijn F. Bruinsma, and William S. Klug. Elasticity theory of macromolecular aggregates. Physical Review Letters, 109:148102, Oct 2012

Research Profile

Name: Dr Lee Etchels

Position: Research Fellow
Institute/division: Institute of Medical and Biological Engineering, University of Leeds
Email: l.w.etchels@leeds.ac.uk
Tel: (00) 44 113 3436360

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas

Finite element analysis; structural analysis; computational modelling; numerical optimisation; periprosthetic femoral fractures; joint replacements; hip joint contact mechanics, mathematical tool development.

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

Primary Research interests:

Dr Lee Etchels is an Aerospace and Aeronautical Engineering graduate (University of Leeds), with PhD research on the optimisation of treatment methods for periprosthetic femoral fractures, using both computational modelling and experimental testing. Lee is a research fellow at the University of Leeds using computational modelling to assess the contact mechanics and implant survivability of hip replacement components.

Main research areas include:

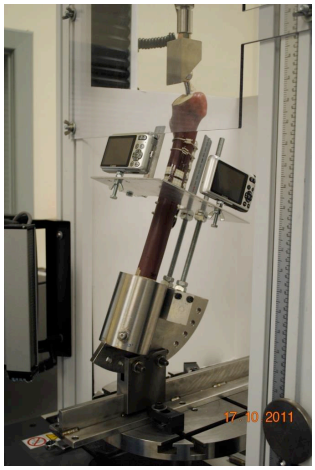
- Computational modelling of fracture fixation devices
- Mechanical testing of fracture fixation devices
- Dynamic modelling of hip replacement components
- Simulation of in vivo patient activities and loading profiles
- Numerical optimisation techniques for design modification and selection (including optimising the orientation of anisotropic materials in a structure)
- Development of clinical and research applications in open-source programming languages

Topics in which you would like to develop collaborative research:

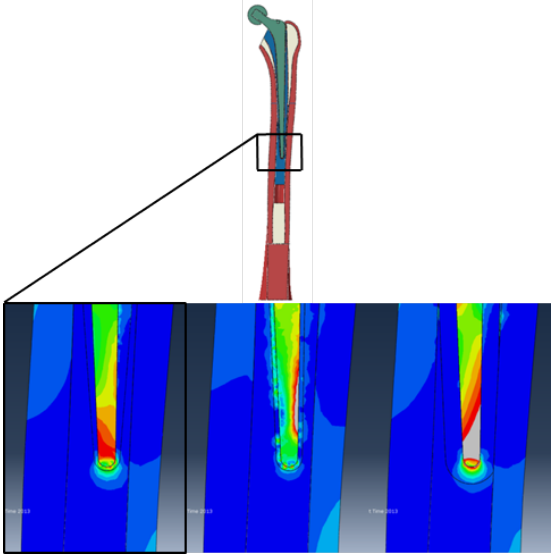
- Fracture fixation devices
- Improved joint replacement design
- Use of optimisation and computational models to define optimal usage of anisotropic material for biomedical function
- Devices and instrumentation for improving joint replacement positioning during surgery
- Measurement of joint displacements and loading for inputs and boundary conditions to computational models
- Computationally efficient modelling techniques, including intelligent search mechanisms and model reduction techniques
- Adaptive biomechanical modelling, where the inputs and boundary conditions to the model are dependent on the response of the model, as opposed to being fixed

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Currently working in collaboration with DePuy Synthes, previously worked with Stryker and Proctor & Gamble.

Relevant graphics, figures, pictures:
Use this area to show pictures or scientific figures which illustrate your research



Mechanical testing rig for periprosthetic femoral fracture treatments.


Von Mises stress results of computational models investigating the effect of cement distribution on stem fixation.

Publications and other outputs relevant to your interest in this programme (up to 5)

- Moazen, M., Mak, J.H., Etchels, L.W., Jin, Z., Wilcox, R.K., Jones, A.C., Tsiridis, E., 2013. The effect of fracture stability on the performance of locking plate fixation in periprosthetic femoral fractures. J. Arthrop. 28, 1589-1595.
- Etchels, L.W., Moazen, M., Mak, J.H., Jones, A.C., Jin, Z., Tsiridis, E., Wilcox, R.K., 2013. Validating finite element models of periprosthetic femoral fractures treated with long stem revision using experimental results. Presentation to the 19th Congress of the European Society of Biomechanics, Patras, Greece.
- Etchels, L.W., 2014. Optimisation of fixation methods for Vancouver Type B2 and B3 periprosthetic femoral fracture treatment. PhD thesis, University of Leeds.
- Etchels, L.W., Moazen, M., Mak, J.H., Wilcox, R.K., Jin, Z., Tsiridis, E., Jones, A.C., 2014 Improved sensitivity from periprosthetic femoral fracture models using relaxed boundary conditions. Presentation to the 7th World Congress of Biomechanics, Boston, USA.
- Moazen, M., Mak, J.H., Etchels, L.W., Jin, Z., Wilcox, R.K., Jones, A.C., Tsiridis, E., 2014. Periprosthetic femoral fracture – a biomechanical comparison between Vancouver Type B1 and B2 fixation methods. J. Arthrop. 29, 495-500.

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: Dr. Ning Chen

Position: lecturer

Institute/division: State Key Lab of Polymer Materials Engineering, Polymer Research Institute, Sichuan University

Email: ningchen@scu.edu.cn

Tel: +86-28-85405133, +86-13551191850

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Thermal Processing of Poly (vinyl alcohol)(PVA), High Performance Polymeric Fibre, Micro-injection moulding and 3D Printing of Polymer Based Functional Micro/Nano composites

聚乙烯醇热塑加工新技术，高性能聚合物纤维，聚合物基微纳米功能复合材料的微成型加工和 3D 打印加工

Primary Research interests:

1. New technology for thermal processing of poly(vinyl alcohol) :
   - Adopting molecular complexation and plasticization to obtain the thermal processing window of PVA and realize its extrusion, melt spinning, thermal blowing, injection moulding, etc. the higher performance PVA fibers, films, sheets and hollow containers were obtained.
   - Synthesized thermoplastic PVA by controlling the comonomer, the side chain length and distribution, as well as the crystallinity of PVA. A small amount of long-chain branched comonomer can significantly improve the thermal stability of PVA, decrease its melt point. The Thermal processing window of PVA was over 90^{o}C when the ratio of comonomer was about 4%.
2. Preparing high performance and multi-functional PVA based composites, such as PVA/HA, PVA/TCP, suitable for micro-processing by combing the molecular complexation and the solid state shear milling (S^3M) technology and realizing the micro-injection moulding of PVA and PVA based functional composites, which has potential application in biomedical field.
3. Preparing functional polymer blends and polymer based micro/Nano composites suitable for 3D printing by combing the molecular complexation and S^3M technology. Realizing fused deposition modelling(FDM) of PVA blends and PVA based composites, such as PVA/PLA, PVA/PLA/HA. Realizing selective laser sintering (SLS)of polymer based micro/Nano composites, such as PA11/ TiBaO3 Piezoelectric Composites.

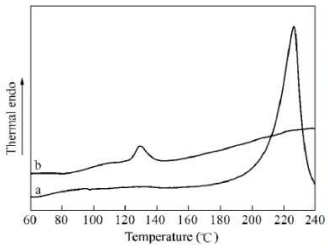
Topics in which you would like to develop collaborative research:

- **High performance and multi-functional environment-friendly polymer based composites used for 3D printing and micro-injection moulding**
- **Application of PVA-based composites in biomedical field**

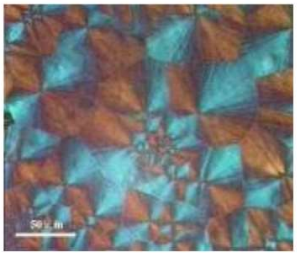
Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

Collaboration with the Polymer IRC at University of Bradford in polymer micro-injection moulding and the PVA based composite used for joint soft tissue repair.

Relevant graphics, figures, pictures:



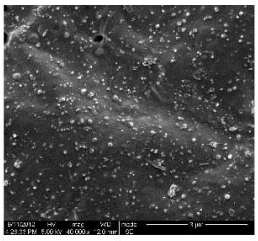
DSC endotherms of PVA (a) and modified PVA (b) using high-pressure stainless steel pan



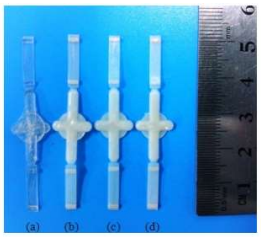
Polarizing light micrographs of PVA crystallized from melt

The melt spinning of PVA fiber for medium scale production

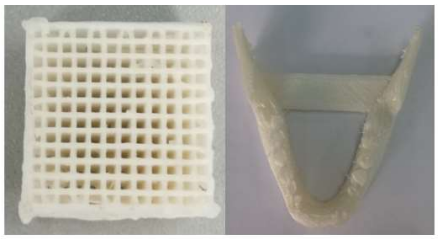
Photo of PVA as-spun fibers



SEM photo of PVA/n-HA composite with 30 wt.% n-HA prepared by solid state shear milling



Micro-injection samples of PVA/n-HA composites. (a) PVA, (b) 10%HA, (c) 20%HA, (d) 30%HA.



PVA based biological scaffold (left) and human jaw model(right) processed by fused deposition modelling

Publications and other outputs relevant to your interest in this programme (up to 5)

1. N. Chen, L. Li and Q. Wang. New technology for thermal processing of poly(vinyl alcohol). Plastics, Rubber and Composites, 2007, 36(7-8): 283-290
2. Qian Wu, Ning Chen, Qi Wang. Crystallization behavior of melt-spun poly (vinyl alcohol) fibers during drawing process. Journal of Polymer Research, 2010, 17: 903-909
3. Li Li, Ning Chen, Qi Wang. Effect of Poly(ethylene oxide) on the Structure and Properties of Poly(vinyl alcohol). Journal of Polymer Science: Part B: Polymer Physics, 2010, 48: 1946-1954
4. Yu-jun Yang, Ning Chen, Qi Wang, Thermal-processing properties of polyvinyl alcohol/gelatin/nano-hydroxyapatite composites. Acta Polymerica Sinica, 2014, (7): 956-962
5. Huan Wang, Ning Chen, Qi Wang, Interaction Between Tricalcium Phosphate and Poly(vinyl alcohol) and Its Effect on the Thermal and Mechanical Properties of Poly(vinyl alcohol), Chemical Journal of Chinese Universities,2-14, 35(8):1810-1815

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: Min Nie

Position: Associate professor
Institute/division: State Key Laboratory of Polymer Materials Engineering, Polymer Research Institute of Sichuan University
Email: poly.nie@gmail.com
Tel: 13540757771

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

Novel technology and theory for preparation and processing of polymer materials

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

高分子材料制备和加工新技术新原理的研究

Primary Research interests: *A fuller description of your main research areas.*

- Rotation extrusion of polymer pipe: The stress and temperature field during polymer pipe extrusion is controlled to adjust their crystallization and orientation so as to produce polymer pipes with higher performances.
- Preparation of polymer/inorganic nanocomprosites: Ultrasonic irradiation and solid-phase mechano-chemical technologies are introduced to resolve the problems of the dispersion, stabilization and compositing of nanoparticles with polymer matrix so as to prepare polymer nanocomposites with high performance and multi-functionality.

Topics in which you would like to develop collaborative research:

Please indicate here research areas for which you would like to find partners to undertake joint research.

- Novel technology and theory of polymer processing
- Polymer crystallization mechanism

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Include here any relevant collaborations you have

Relevant graphics, figures, pictures:
Use this area to show pictures or scientific figures which illustrate your research

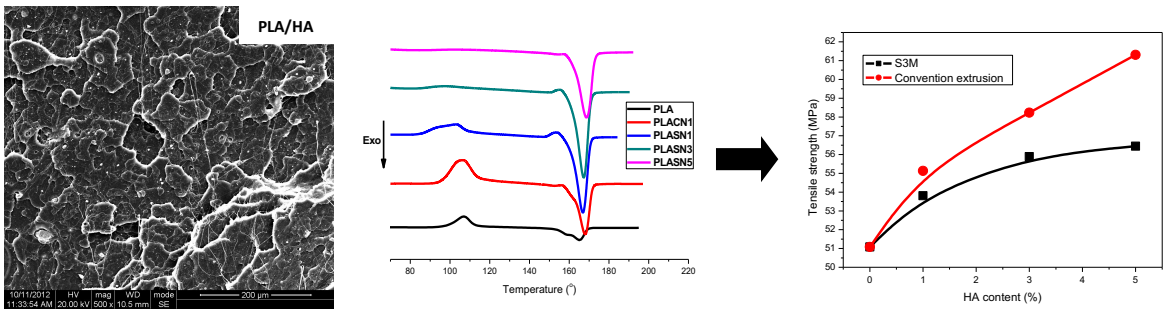


Figure 1 Structure and Properties of Poly(lactide)/Hydroxyapatite Nanocomposites Prepared by Solid State Shear Milling (S3M) Method

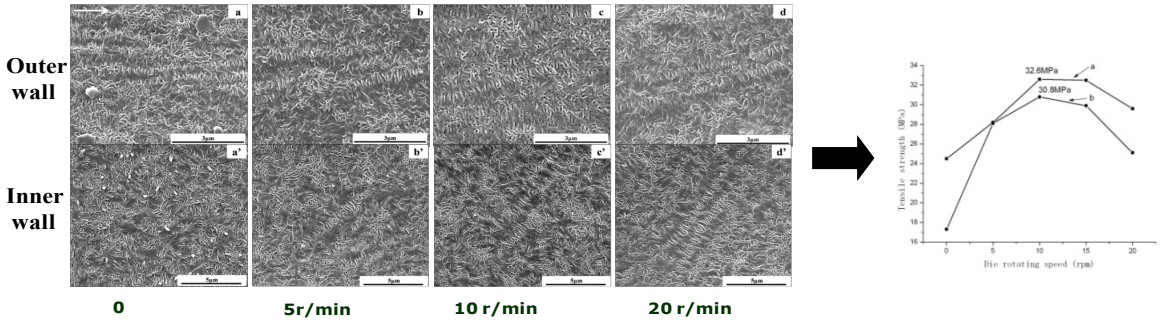


Figure 2 Structure and Properties of PE pipes by rotation extrusion

Publications and other outputs relevant to your interest in this programme (up to 5)
Please give references to your key recent research publications

[1] Shi S, Zhang X, Liu Y, Nie M, Wang Q. Crystalline modification and morphology of polypropylene developed under the combined effects of montmorillonite and self-assembly β nucleating agent. Composites Science and Technology. 2016;135:76-82.
[2] Shi S, Liu W, Nie M, Wang Q. Localized self-assembly and nucleation: a new strategy for preparing highly toughened polymer blends. RSC Advances. 2016;6(100):98104-8.
[3] He X, Li Y, Nie M, Wang Q. Root-like glass fiber with branched fiber prepared via molecular self-assembly. RSC Advances. 2016;6(51):45492-4.
[4] Li X, Pi L, Nie M, Wang Q. Joint effects of rotational extrusion and TiO2 on performance and antimicrobial properties of extruded polypropylene copolymer pipes. Journal of Applied Polymer Science. 2015;132(33):n/a-n/a.
[5] Pi L, Hu X, Nie M, Wang Q. Role of Ultrahigh Molecular Weight Polyethylene during Rotation Extrusion of Polyethylene Pipe. Industrial & Engineering Chemistry Research. 2014;53(35):13828-32.

Research Profile

Name: Zhiyong Jiang
Position: Associate Professor
Institute/division: State Key Laboratory of Polymer Physics and Chemistry, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences
Email: jiangzhy@ciac.ac.cn
Tel: (00)86 431 85262961

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

Processing-microstructure-property relationships in crystalline polymers; in situ polymer structuring process under flow-induced crystallization and deformation using small angle X-ray scattering

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

结晶高分子材料的加工-微观结构-性能之间的关系；高分子结晶和形变行为的小角 X 射线散射原位研究。

Primary Research interests: *A fuller description of your main research areas.*

We mainly focus on the in situ structural evolution of semicrystalline polymers, such as polyolefin and biodegradable polymers, under various imposed fields by means of synchrotron small-angle X-ray scattering (SAXS) technique, and correlate the structural and morphological information at the molecular and nanometric length scales to the macroscopic properties.

The other research interest is polymer crystallization, including crystallization mechanism and the laws on how the crystallization conditions affect the polymer microstructure and morphology, and thus the mechanical properties of the final product.

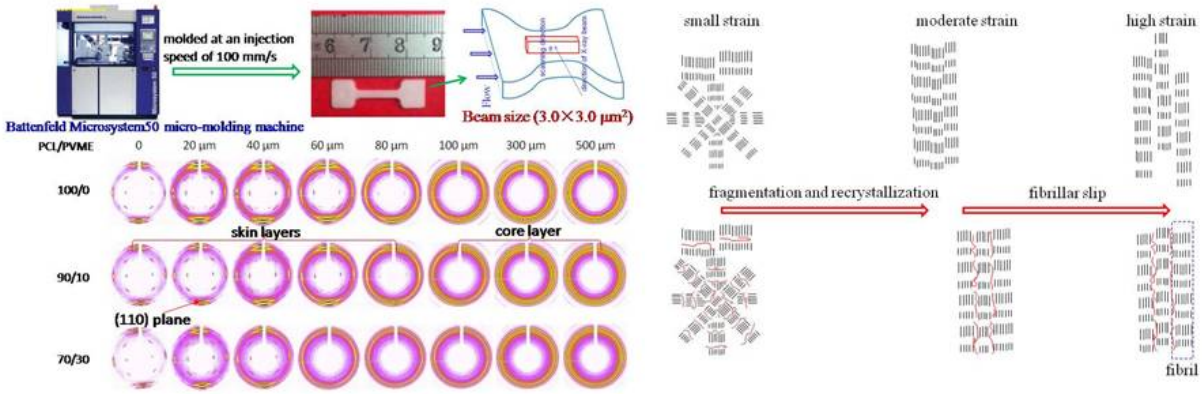
Topics in which you would like to develop collaborative research:

Please indicate here research areas for which you would like to find partners to undertake joint research.

Polymer processing including micromolding, injection moulding, ultrasonic moulding and die drawing, and multi-scale computer modelling of polymer structuring process.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Include here any relevant collaborations you have
China: Daqing Petrochemical Research Institute, PetroChina Co. Ltd.
UK: Research Exchanges with China and India project supported by the Royal Academy of Engineering with University of Bradford.

Relevant graphics, figures, pictures:
Use this area to show pictures or scientific figures which illustrate your research



Structure distributions of micromolded poly(ε-caprolactone) and its miscible blends with poly(vinyl methyl ether) together with the schematic representation of their structural evolution upon tensile stretching.

Publications and other outputs relevant to your interest in this programme (up to 5)
Please give references to your key recent research publications

1. Lu Y; Wang YT; Chen R; Zhao JY; Jiang ZY; Men YF, 'Cavitation in Isotactic Polypropylene at Large Strains during Tensile Deformation at Elevated Temperatures', *Macromolecules* 2015, *48(16)*, 5799-5806.
2. Wang YT; Lu Y; Zhao JY; Jiang ZY; Men YF, 'Direct Formation of Different Crystalline Forms in Butene-1/Ethylene Copolymer via Manipulating Melt Temperature', *Macromolecules* 2014, *47(24)*, 8653-8662.
3. Wang YT; Jiang ZY; Fu LL; Lu Y; Men YF, 'Lamellar Thickness and Stretching Temperature Dependency of Cavitation in Semicrystalline Polymers', *PLOS ONE* 2014, *9(5)*, e97234.
4. Jiang ZY; Wang YT; Fu LL; Whiteside B; Wyborn J; Norris K; Wu ZH; Coates P; Men YF, 'Tensile Deformation of Oriented Poly(ε-caprolactone) and Its Miscible Blends with Poly(vinyl methyl ether)', *Macromolecules* 2013, *46(17)*, 6981-6990.
5. Jiang ZY; Fu LL; Sun YY; Li XH; Men YF, 'Deformation-Induced Phase Separation in Blends of Poly(ε-caprolactone) with Poly(vinyl methyl ether)', *Macromolecules* 2011, *44(17)*, 7062-7065.

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: **Xiang Lin**

Position: **Lecturer**

Institute/division: **University of Science and Technology/ Beijing University of Chemical Technology**

Email: **xiang003.buct@163.com; linxiang@ustb.edu.cn**

Tel: **86+ 13241854343**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

Polymer processing engineering; rheological measurements in polymer processing; Polymeric nano-composites, aiming to novel technology for nano-additives dispersion and distribution as well as the interfacial modification.

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

聚合物加工工程；流变测试与分析/聚合物加工流变学；聚合物纳米复合材料混合新技术，面向纳米颗粒在粘弹性聚合物熔体中的分散、分布混合以及表面改性技术。

Primary Research interests: *A fuller description of your main research areas.*

Polymer processing. Develop Novel technology to induce predicted structure by processing.

Rheological measurement. To explore the interfacial morphology between nano-inclusions and matrix through rheological response, aiming to moderate the inner structure of nano-composites.

Functional nano-composites. Healthcare and medical materials, electrical/heat conductive composites, dielectrics and biomaterials, which can be processed by micro moulding, precise extrusion and other methods under a certain pressure and temperature.

Uniaxial/ biaxial extension of function sheets/films/membranes. Develop apparatus and advanced process technologies.

Topics in which you would like to develop collaborative research:

Please indicate here research areas for which you would like to find partners to undertake joint research.

Potential application of die-drawing technology for high speed road protection devices.

Extensional flow behaviour for dis-aggregation of the nano-particles, requiring a good dispersion state.

Biaxial drawn device development for experimental requirements.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Include here any relevant collaborations you have

Include: University of Bradford, Sichuan University and Institute of Applied Chemistry CAS Changchun

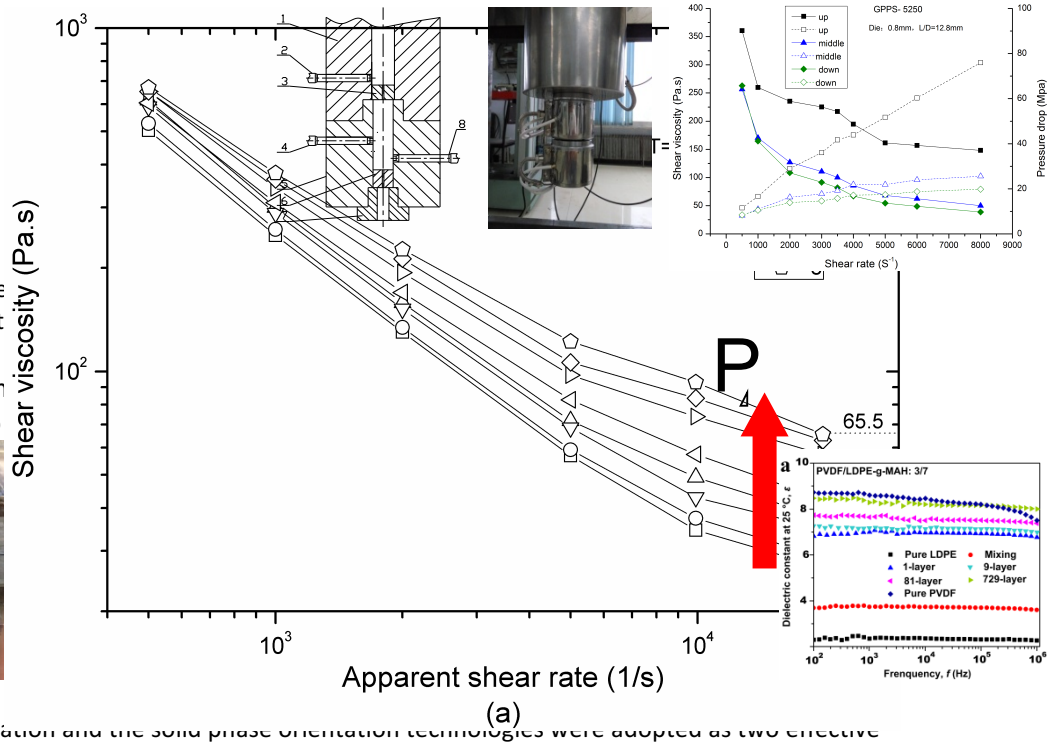
Relevant graphics, figures, pictures:
Use this area to show pictures or scientific figures which illustrate your research

1. **Pressure effect on viscosity of polymer melts in capillary flow. Rheometer design & manufacture.**

Geometrical de
Pressure sensit

2. Structurin
aiming to

Biaxial



Layer multiplication and the solid phase orientation technologies were adopted as two effective strategies to optimize the dispersion state and the orientation of internal microstructure.

Publications and other outputs relevant to your interest in this programme (up to 5)
Please give references to your key recent research publications

- **Xiang Lin** et al. Shear-induced Crystallization Morphology and Mechanical Property of High Density Polyethylene in Micro-injection molding. *Journal of Polymer Research*, 2013, 20(4): 1-12
- **Xiang Lin** et al. Capillary Study on Geometrical Dependence of Shear Viscosity of Polymer melts. *Journal of Applied Polymer Science*, 131(6): 596-602
- **Xiang Lin** et al. Effect of the compatibility on dielectric performance and breakdown strength of poly(vinylidene fluoride)/low density polyethylene blends. *Journal of Applied Polymer Science*, 2015,132, 42507
- **Xiang Lin** et al. Improved dielectric performance of polypropylene/multi-walled carbon nanotubes nanocomposites by solid phase orientation. *Journal of Applied Polymer Science*, 2016, 133(3): DOI: 10.1002/app.42893
- **Xiang Lin** et al. Enhanced dielectric properties of immiscible poly (vinylidene fluoride)/low density polyethylene blends by inducing multilayered and orientated structures. Composites B. Under revision.

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: **David Berry**

Position: **Lecturer in Pharmaceutics**

Institute/division: **Durham University/ Pharmacy**

Email: **d.j.berry@durham.ac.uk**

Tel: **01913 340817**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

I am a pharmacist by training and my research interests are in drug discovery, delivery and pharmacokinetics. Much of my work is associated with the modification of the solid state of drug molecules through the application of controlled physical form changes (e.g. the use of co-crystals) to improve delivery to a patient but also robust manufacture.

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

Primary Research interests: *A fuller description of your main research areas.*

- Pharmaceutical co-crystals: I currently have on-going work on the determination of structure property relationships between the parent and co-former molecule within co-crystalline materials. This work aims to improve the development properties of pharmaceutical materials through structural knowledge. This has included the application of design of experiments approaches to the screening of drug molecules to determine new functional phases.
- Co-amorphous materials: These are an emergent type of functional material, which can lead to the modification of drug solubility and other materials properties. Preliminary work within my group has suggested the predictable nature of the bonding within these phases, although significant further work is required to realise this potential.
- Pharmacokinetics: I have a number of drug projects where the *in silico* prediction of PK has been able to answer broader questions, along with novel small molecule prediction. How do you treat anorexics with SSRI therapy? Is it legal to drive with prescribed morphine? Etc.
- Drug discovery and Delivery: I have an active project developing peptide prodrugs for treatment of glioma.

Topics in which you would like to develop collaborative research:

Please indicate here research areas for which you would like to find partners to undertake joint research.

- Developing useful co-amorphous materials for drug delivery and broader applications.
- Determining structure property relationships in co-crystals for novel applications, implant coatings etc.
- Predicting pharmacokinetics of small molecule release in standard preparations and from novel drug delivery platforms and mechanical implants. E.g. Can plasticiser release from novel implant materials be predicted to ensure within safe levels?

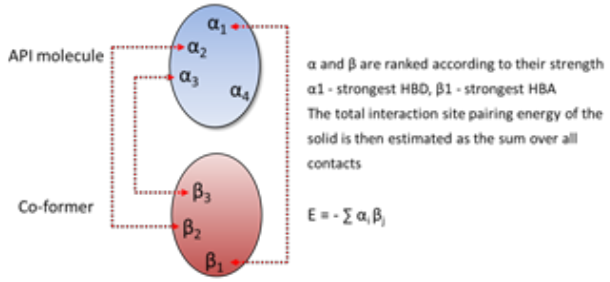
Relevant existing collaborations (academic) inside or outside China.

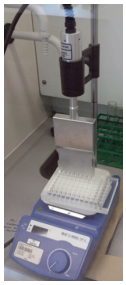
UK pharmaceutical industry: AstraZeneca 3 funded PhD students. Chair of the Association of Pharmaceutical Sciences materials science group.

Durham University: Chemistry department Professor Jon Steed, control of crystal growth through supramolecular gels. Pharmacology- Dr Jason Gill, design of peptide prodrugs for treatment of glioma.

University of York: Dr Jason Boland, prediction of the pharmacokinetics of pain killers for legal driving.

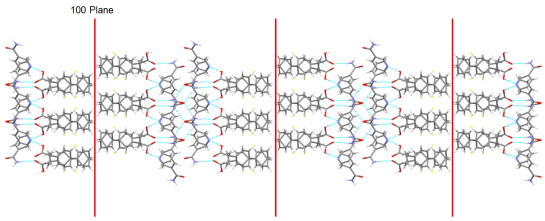
Relevant graphics, figures, pictures:



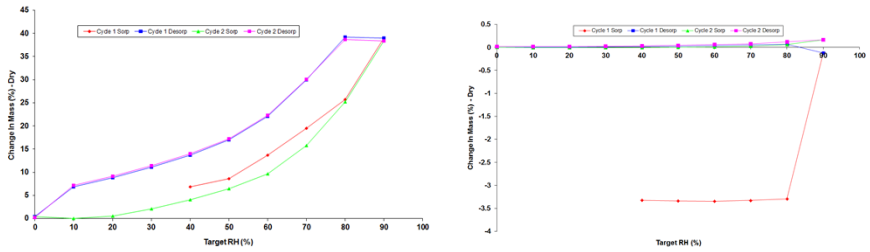


Linking computational prediction with physical form screening using gas phase predictions and well plate approaches

Fig. 1. Computational and physical screening for new physical forms for drug development



Better tabletting properties due to slip planes in the crystal structure



Better physical stability, due to reduced hygroscopicity

Fig. 2. Linking the structure of new materials to their function

Publications and other outputs relevant to your interest in this programme (up to 5)

Please give references to your key recent research publications

• Stabilisation of an amorphous form of ROY through a predicted co-former interaction, ChemComm, 2016, 52, 6537
• Tuning the spontaneous formation kinetics of caffeine:malonic acid co-crystals, CrystEngComm, 2016, 18, 2617 – 2620.
• Pharmaceutical Co-crystals- Are we there yet? CrystEngComm, 2014, 16: 5753-5761.
• Applying hot-stage microscopy to co-crystal screening: a study of nicotinamide with seven active pharmaceutical ingredients – Crystal Growth and Design, 2008, 8, 1697-1712.
• Current directions in co-crystal growth – New Journal of Chemistry, 2008, 32, 1659–1672.

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: **Fei Yang**

Position: **Associate Professor**

Institute/division: **Institute of Chemistry, Chinese Academy of Sciences**

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Tel: **+86-10-62565822**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

Design, synthesis, modification and fabrication of biodegradable polymers especially polylactones for applications in drug delivery and Tissue Engineering and regeneration.

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

聚内酯类可降解生物材料的设计、合成、改性与加工成型，及其在药物控制释放和组织工程与再生中的应用。

Primary Research interests: *A fuller description of your main research areas.*

My main research area is clinical applications of biomaterials. Based on clinical requirements, I design and synthesis of biodegradable polymers with suitable physical and chemical properties including molecular structure, biomechanics, degradation behaviour, active groups. I focus on techniques to fabricate scaffolds, implants and micro/nano particles. To meet the needs in living body, bulk and surface modification techniques are developed or adopted to introduce living groups and bioactivator, or gain better properties. Products above are used in drug delivery system including long-term, responsive drug release and targeting drug delivery. And they are also adopted in tissue engineering to regenerate bone, cartilage, spinal cord and intervertebral discs. Some special applications are also studied including a combined system of diagnosis with ultrasonic image and MRI and treatment with responsive drug delivery used in cardiovascular medicine, as well as a combined system of local long-term drug release and bone tissue engineering used in bone tuberculosis.

Topics in which you would like to develop collaborative research:

Please indicate here research areas for which you would like to find partners to undertake joint research.

My primary research interests are clinical applications of biomaterials especially cartilage and bone tissue engineering, and diagnosis and treat agents.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Include here any relevant collaborations you have
Chinese PLA General Hospital (301), Chinese PLA 309 Hospital and Peking University Third Hospital.

Relevant graphics, figures, pictures:
Use this area to show pictures or scientific figures which illustrate your research

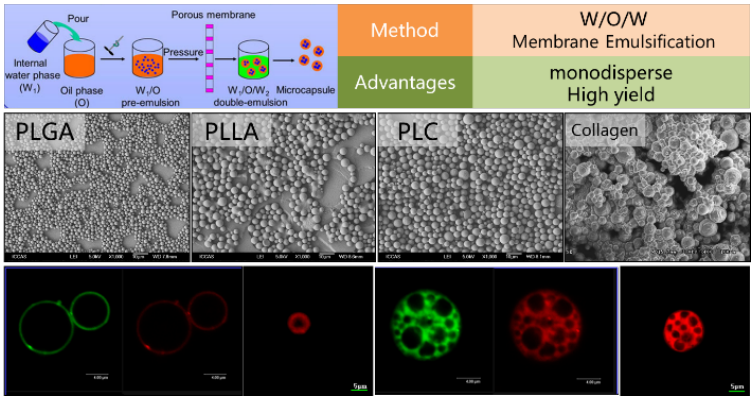


Fig. 1. Microcapsules for Drug Delivery System

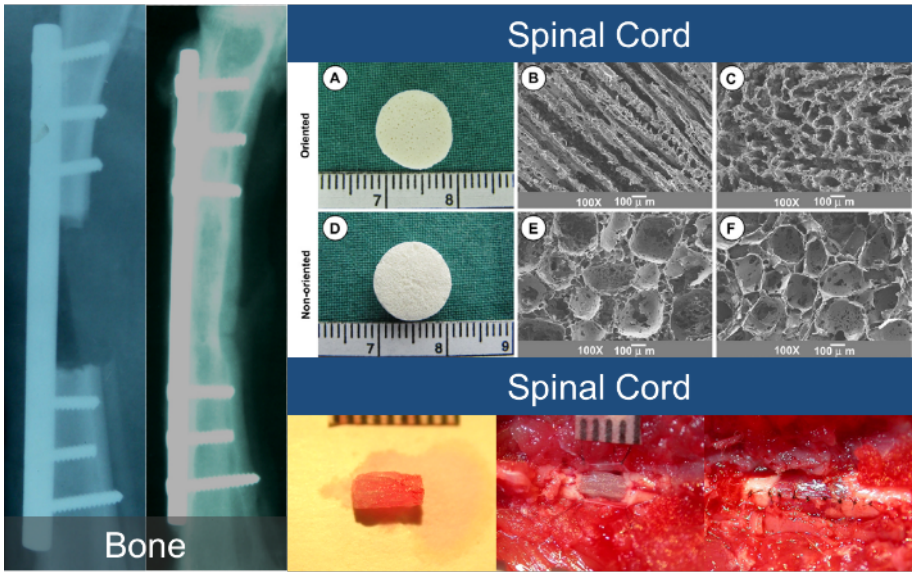


Fig.2 Tissue Engineering

Publications and other outputs relevant to your interest in this programme (up to 5)
Please give references to your key recent research publications

1. Yazhong Bu[1], Licheng Zhang[1], Jianheng Liu, Lihai Zhang, Tongtong Li, Hong Shen, Xing Wang, **Fei Yang**,* Peifu Tang,* Decheng Wu.* Synthesis and Properties of Hemostatic and Bacteria-Responsive in Situ Hydrogels for Emergency Treatment in Critical Situations. ***ACS Applied Materials & Interfaces*** 2016, 8: 12674-12683.

2. Da Huang[1], Dawei Li[1], Tiantian Wang, Hong Shen, Pei Zhao, Baoxia Liu, Yezi You, Yuanzheng Ma*, **Fei Yang**,* Decheng Wu,* Shenguo Wang. Isoniazid conjugated poly(lactide-co-glycolide): Long-term controlled drug release and tissue regeneration for bone tuberculosis therapy. ***Biomaterials*** 2015, 52: 417-425.

3. Pei Zhao, Dawei Li, **Fei Yang**,* Yuanzheng Ma, Tiantian Wang, Shun Duan, Hong Shen, Qing Cai,* Decheng Wu, Xiaoping Yang, Shenguo Wang. In vitro and in vivo drug release behavior and osteogenic potential of a composite scaffold based on poly(e-caprolactone)-block-poly(lacticco-glycolic acid) and b-tricalcium phosphate. ***Journal of Materials Chemistry B*** 2015, 3: 6885--6896.

4. Baoxia Liu[1], Xiao Zhou[1], **Fei Yang**,* Hong Shen, Shenguo Wang, Bo Zhang, Guang Zhi, Decheng Wu*. Fabrication of uniform sized polylactone microcapsules by premix membrane emulsification for ultrasound imaging. ***Polymer Chemistry*** 2014, 5: 1693-1701.

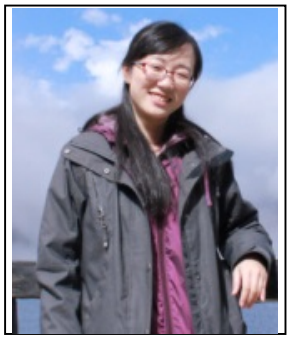
5. Sijia Xu[1], **Fei Yang**[1], Xiao Zhou, Yaping Zhuang, Baoxia Liu, Yang Mu, Xing Wang, Hong Shen, Guang Zhi, Decheng Wu.* Uniform PEGylated PLGA Microcapsules with Embedded Fe3O4 Nanoparticles for US/MR Dual-Modality Imaging. ***ACS Applied Materials & Interfaces*** 2015, 7: 20460-20468.

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile



Name: Rong Chen

Position: Assistant Professor
Institute/division: Polymer Research Institute of Sichuan University
Email: rongchen@scu.edu.cn
Tel: 86-28-86466255

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

Structuring of biodegradable polymers and the composites during the hot-melt processing; controlled drug release

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

生物降解高分子在加工过程中的形态结构演变，药物控制释放

Primary Research interests: *A fuller description of your main research areas.*

Morphological variation of *biodegradable polymers and drugs during the hot-melt processing; design of drug release behaviors; selective distribution of drugs in polymer composites; polymer implants; polymer crystallization; polymer blends and composites*

Topics in which you would like to develop collaborative research:

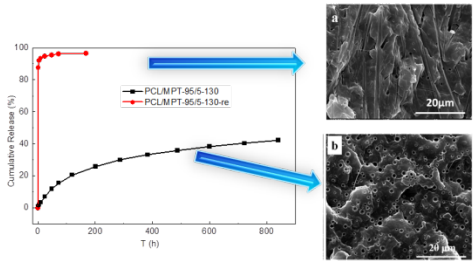
Please indicate here research areas for which you would like to find partners to undertake joint research.

Morphological and structural development of polymer and the blends during the processing; novel manufacture processing for polymer, polymer blends and polymer composites to meet the requirements of drug delivery and tissue engineering applications; medical devices with tailored drug release behaviors

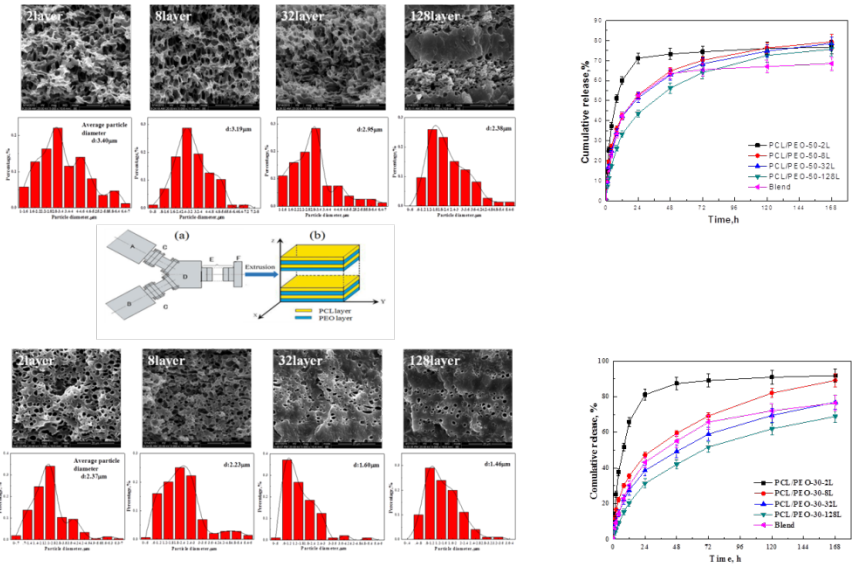
Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Include here any relevant collaborations you have

Relevant graphics, figures, pictures:

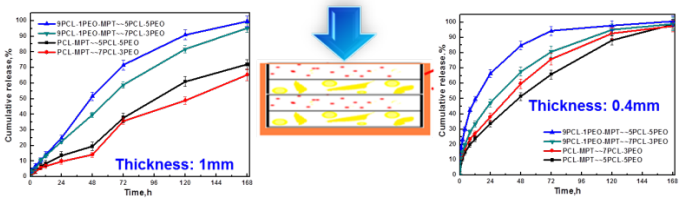
Use this area to show pictures or scientific figures which illustrate your research



Different processing caused different morphology and release behaviors of drugs



Alternating multilayered drug carriers were obtained through co-extrusion, and the drug release was easily adjusted due to the morphology and structure of the composites.



Different distribution and diffusion channels of drugs caused different drug release behaviors.

Publications and other outputs relevant to your interest in this programme (up to 5)

Please give references to your key recent research publications

1. **Rong Chen**, Genlin Li, Aichun Han, Hong Wu*, Shaoyun Guo*， Controlled Release of Diclofenac Sodium from Polylactide Acid based Solid Dispersions Prepared by Hot Melt Extrusion, Journal of Biomaterials Science, Polymer Edition, 2016, 27: 529-543

2. **Rong Chen**, Haibo Qu, Shaoyun Guo*, Paul Ducheyne*， The design and synthesis of a soluble composite silica xerogel and the short-time release of proteins, Journal of Materials Chemistry B, 2015, 3: 3141-3149

3. **Rong Chen**, Haibo Qu, Ashwin Agrawal, Shaoyun Guo*, Paul Ducheyne*. Controlled release of small molecules from silica xerogel with limited nanoporosity, Journal of Materials Science: Materials in Medicine, 2013, 24(1): 137-146

4. Cong Zhang, Xia Chen, Guiting Liu, **Rong Chen***, Shaoyun Guo*， Mechanism And Kinetics Of Drug Release From Poly(ε-Caprolactone) Based Extrudates Prepared By Hot-Melt Extrusion, Journal of Macromolecular Science Part B-Physics, 2016, 55(3): 285-298

5. Cong Zhang, Xia Chen, Guiting Liu, Hong Wu, Jiang Li *, **Rong Chen***, Shaoyun Guo， Preparation of alternating multilayered polyethylene oxide /poly(ε-caprolactone) and the confined crystallization of the composites, RSC Advances, 2015, 5(120): 98999-99007

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: **Shi Rui**

Position: **Associate research fellow**

Institute/division **Beijing Jishuitan hospital, Fourth Clinical Medical College of Peking University**

Email: **sharell@126.com**

Tel: **86-13701246925; 86-010-58517081**

SUMMARY OF MY

RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

Bone/cartilage replacement and regeneration biomaterial;
Wound dress biomaterials
Implant Surface Modification with the Biological responding release properties;
Antibarial treatment of the biomaterials

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

骨/软骨替代与再生类生物材料；
伤口护理类生物材料；
植入物表面的生物响应型释放修饰；
植入物的抗菌处理

Primary Research interests: *A fuller description of your main research areas.*

Design and preparation of the bone/cartilage tissue engineering scaffold by 3D printing;
Design and preparation of the novel artificial cervical disc;
Antibacterial guide tissue/ bone regeneration membrane with control release property;
Inflammatory responding surface modification of the artificial cervical disc;
Infection responding surface modification of the artificial joint;

Topics in which you would like to develop collaborative research:

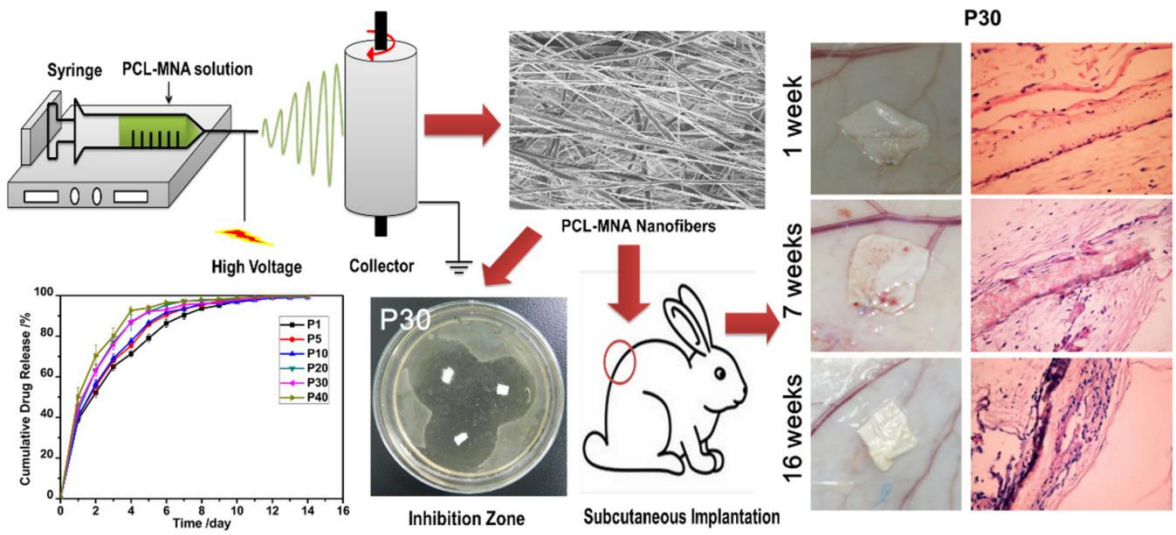
Please indicate here research areas for which you would like to find partners to undertake joint research.

bone/cartilage replacement and regenera*tion* biomaterial and wound dressing biomaterials, especially those needs to translate from bench to clinic.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Include here any relevant collaborations you have

Prof. Liqun Zhang's group in Beijing University of Chemical Technology

Relevant graphics, figures, pictures:
Use this area to show pictures or scientific figures which illustrate your research



Publications and other outputs relevant to your interest in this programme (up to 5)
Please give references to your key recent research publications

1. Jiajia Xue; Min He; Hao Liu; Yuzhao Niu; Aileen Crawford; Phil Coates; Dafu Chen; **Rui Shi***; Liqun Zhang*.Drug loaded homogeneous electrospun PCL/gelatin hybrid nanofiber structures for anti-infective tissue regeneration membranes. Biomaterials. 2014 Nov; 35(34):9395-405. (**corresponding author**)
2. Jiajia Xue, Min He, Yuanzhe Liang, Aileen Crawford, Phil Coates, Dafu Chen, **Rui Shi*,** Liqun Zhang*. Fabrication and evaluation of electrospun PCL-gelatin micro-/nanofibers membrane for anti-infective GTR implant. Journal of Materials Chemistry B. 2014, 2, 6867-6877 (**corresponding author**)
3. Jiajia Xue *, **Rui Shi** *, Yuzhao Niu , Min Gong, Phil Coates, Aileen Crawford, Dafu Chen, Wei Tian, Liqun Zhang. Fabrication of drug-loaded anti-infective guided tissue regeneration membrane with adjustable biodegradation property. Colloids and Surfaces B. 2015，135（1），846-854 (*co-first)
4. Jiajia Xue, Min He, YuzhaoNiu, Hao Liu, Aileen Crawford, PhilCoates, Dafu Chen, **Rui Shi***, Liqun Zhang*. Preparation and in vivo efficient anti-infection property of GTR/GBR implant made by metronidazole loaded electrospun polycaprolactone nanofiber membrane. International Journal of Pharmaceutics. 2014,455(1-2): 566-577.（ **corresponding author**）
5. **Rui Shi,** Jiajia Xue , Hanbin Wang, Renxian Wang, Min Gong, Dafu Chen, Liqun Zhang, Wei Tian. Fabrication and evaluation of homogeneous electrospun PCL/gelatin hybrid membrane as antiadhesion barrier for craniectomy. Journal of Materials Chemistry B. 2015，3，4063-4073（IF=4.726）

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: Melissa Rodrigues

Position: PhD researcher
Institute/division: Cardiff University/School of Pharmacy
Email:rodriguesmc@cardiff.ac.uk
Tel:00447513470458

SUMMARY OF MY RELEVANT RESEARCH AREAS:

I am interested in the medical-devices area, and related research to improve their performance. In particular joint replacements, that in the last decades have shown an increasing rate of revision surgeries, affecting mainly the elderly population.

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

Primary Research interests: *A fuller description of your main research areas.*

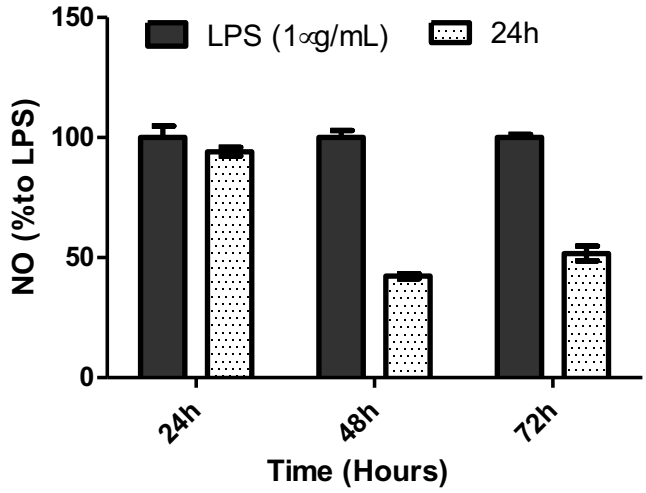
1. Surface modification of Total Joint Replacements: aiming to improve the performance of these devices and avoid post-implantation complications such as revision surgery.

2. Bioactive delivery systems development: to achieve local deliver of drugs or bioactive compounds on implant-bone site or site of interest, avoiding systemic side-effects out coming from conventional routes of administration.
3. Bioactive delivery systems characterisation to evaluate surface functionalization, drug loading, and drug release studies of potential novel drug delivery systems.
4. *In vitro* behaviour: Assess the behaviour of novel delivery systems *in vitro* models to mimic biological environment for potential *in vivo* applications.

Topics in which you would like to develop collaborative research:
Please indicate here research areas for which you would like to find partners to undertake joint research.
Total joint replacement improvement
Implant surface functionalization
Local-Drug (nano) delivery systems
In vitro studies; Immune response to novel drug-delivery systems

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Include here any relevant collaborations you have
Committee member of Cardiff Institute of Tissue engineering and regeneration (CITER)

Relevant graphics, figures, pictures:
Use this area to show pictures or scientific figures which illustrate your research



Influence of dexamethasone released from TiO_2 particles after 24h (broths collected from release studies performed at pH=7) in nitric oxide (NO) production in LPS-activated RAW 264.7 macrophages, after 24h, 48h and 72h of exposure. This graph shows that dexamethasone released from TiO_2 particles is able to reduce the levels of nitric oxide on LPS-activated cells, thus suggesting that dexamethasone present an anti-inflammatory activity.

Publications and other outputs relevant to your interest in this programme (up to 5)
Please give references to your key recent research publications

1. Dexamethasone-loaded TiO_2 nanoparticles to locally target wear-debris induced inflammation. Frontiers. Bioeng. Biotechnol. Conference Abstract: 10th World Biomaterials Congress (2016).
2. "Hollow chitosan/alginate nanocapsules for bioactive compound delivery" in *International journal of biological macromolecules* (2015), Volume 76, pp 95-102.
3. "Design of bio-nanosystems for functional compounds delivery" in Food Engineering Reviews (2014), Volume 6, Issue 1, pp 1–19
4. "Edible Bio-Based Nanostructures: Delivery, Absorption and Potential Toxicity" in Food Engineering Reviews (2015), Volume 7, Issue 4, pp 491-513.

Research Profile

Name: Vikaramjeet Singh
Position: Post Doc
Institute/division: Shanghai Institute of Materia Medica
Email: singh.simm@outlook.com
Tel: +8613167025090

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English

Synthesis and characterization of Cyclodextrin Nanosponges and co-polymer, Synthesis and stability enhancement of Cyclodextrin metal organic frameworks, High-throughput method for drug-CD interaction measurements including, HPAC, SPR, SPRi and Molecular docking. Small molecule microarray, protein microarray, drug screening.

Brief summary of your research areas, in Chinese

环糊精纳米海绵和共聚物的合成和表征，环糊精金属有机骨架的合成和稳定性的增强，高通量方法测量药物-CD 的相互作用，包括 HPAC，SPR，SPRi 和分子对。 小分子微阵列，蛋白质微阵列，药物筛选。

Primary Research interests: *Dr. Vikramjeet Singh has done his Ph.D. from National Center for Nanoscience and Technology, Beijing and currently working as postdoc researcher in Shanghai Institute of Materia Medica in Prof. Jiwen Zhang's laboratory. His main research projects include:*

Cyclodextrin nanosponges (CD-NSPs): Besides conventional β-CD-NSPs, the NSPs of α, γ, HP-β, Methyl-β, and SBE-β cyclodextrins were synthesized by a simple modified approach and thoroughly characterized. The control of CDs derivatization over structural dimensions and properties was investigated. Furthermore, CD-NSPs were used for the solubility enhancement of artemether and paclitaxel drugs.

Cyclodextrin co-polymer synthesis: Co-polymer of CD and sialic acid for target drug delivery and surface modification of CD-NSPs with cholesterol and sialic acid for enhanced cellular penetration.

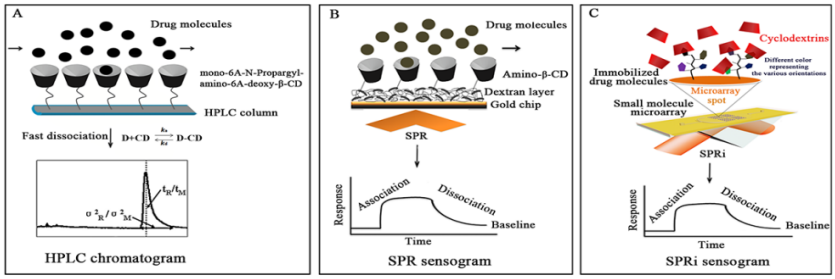
Cyclodextrin metal organic frameworks (CD-MOFs): The major focus of his current research is to improve the stability of moisture sensitive CD-MOFs. Due to fast disintegration of γ-CD-MOFs structure when exposed to humid conditions due to weak coordination bond of γ-CD and alkali, the application in pharmaceutical area remained impractical. Hence, the stability improvement of CD-MOF is highly needed to explore the use of these special materials. Two diverse approach using cholesterol coating and cross-linking have developed for the stability enhancement of CD-MOF.

HTS method Drug-Cyclodextrin interaction measurement: The one part of research is to measure kinetic constant of drug-cyclodextrin interaction using small molecule microarray in combination with surface plasmon resonance imaging technique. Thousands of drugs were printed in microarray format for interaction measurements with 5 different CDs.

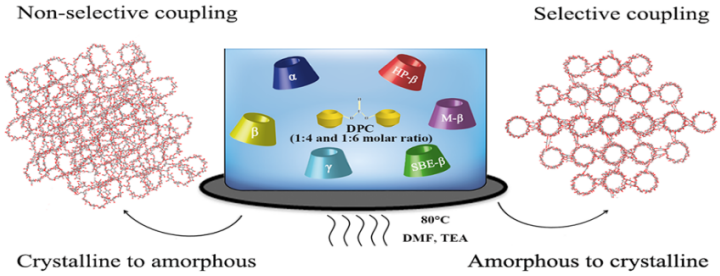
Topics in which you would like to develop collaborative research:
Mainly interested in research and development of materials including, Cyclodextrin Nanosponges, Cyclodextrin co-polymer, Metal organic frameworks (MOFs) for the purpose of drug delivery and material improvement. Measurements of drug-cyclodextrin interaction kinetics using HPAC, SPR, SPRi and molecular docking for enhancement in stability, solubility and bioavailability of various drugs.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.
Cyclodextrins metal organic frameworks projects with University of Paris Sud, Paris; France. University of Bradford, United Kingdom; Shenyang Pharmaceutical University (SPU); Jilin University, Changchun, China; Fudan University, Shanghai, China.

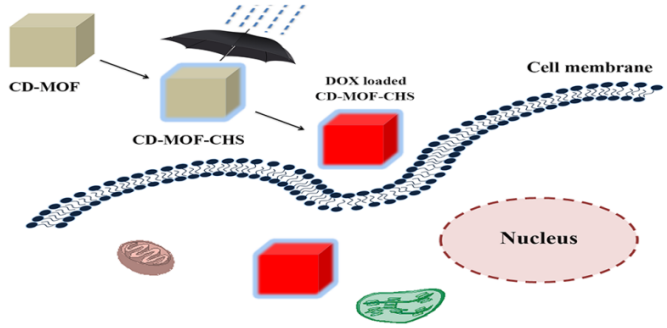
Relevant graphics, figures, pictures:



Three method used for the drug-CD interaction measurements



Crystallinity control over cyclodextrin nanosponges using derivative cyclodextrins



Moisture resistant CD-MOF with high cell penetration

Publications and other outputs relevant to your interest in this programme

- V. Singh, Z. Li, X. Zhou, X. Xu, J. Xu, A. Nand, H. Wen, H. Li, J. Zhu and J. Zhang*. High-throughput measurement of drug-cyclodextrin kinetic rate constants by small molecule microarray. RSC advances, 2016, 6, 3213-3218.
- V. Singh*, A. Nand and Sarita. Universal screening platform using three-dimensional small molecule microarray based on surface plasmon resonance imaging. RSC advances 2015, 5, 87259 - 87265.
- V. Singh, A. Nand, C. Chen. Z.P. Li, S.J. Li, S. Wang, M. Yang, A. Merino, L. Zhang, J. Zhu*. Echinomycin, a potential binder of FKBP12 shows minor effect on calcineurin activity. Journal of biomolecular screening, 2014, 19, 1275, 1281.
- J. Xu[#], V. Singh[#], X. Yin, P. Singh, L. Wu, X. Xu, T. Guo, L. Sun, S. Gui, J. Zhang*. Solvents effects on crystallinity and dissolution of β-artemether. Drug Delivery and Industrial Pharmacy (Revised).
- V. Singh, A. Nand, C. Chen. Z.P. Li, S.J. Li, S. Wang, M. Yang, A. Merino, L. Zhang, J. Zhu*. Echinomycin, a potential binder of FKBP12 shows minor effect on calcineurin activity. Journal of biomolecular screening, 2014, 19, 1275, 1281.

Mentors & Senior Staff Profiles

Phil Coates	Director, Polymer IRC, University of Bradford	Keynote 1
Hesheng Xia	Deputy Director State Key Laboratory for Polymer Materials Engineering (SKLPME) Sichuan University	welcome
Pete Twigg	Medical Engineering, University of Bradford	Keynote 3
Liqun Zhang	Beijing University of Chemical Technology	Keynote 4
Lin Ye	SKLPME Sichuan University	Keynote 5
Anant Paradkar	Pharmaceutical Engineering Science, University of Bradford	Keynote 6
Jiwen Zhang	Shanghai Institute of Materia Medica CAS	Keynote 7
Guangxian Li	Executive Vice President, Sichuan University and Director SKLPME	Welcome
Yunbing Wang	National Engineering Research Centre for Biomaterials, Sichuan University	Keynote 2
Chuhong Zhang	SKLPME	Invited Lecture 1
Ben Whiteside	Polymer Micro & Nano Technology Centre, Polymer IRC, University of Bradford	Invited Lecture 2
Yongfeng Men	Changchun Institute of Applied Chemistry CAS	Invited Lecture 3

BRITISH COUNCIL
RESEARCHER LINKS

Newton Fund

Research Profile

Name:	**Professor Phil Coates**
Position:	**Director, Polymer IRC; Director RCUK Bradford Science Bridges China**
Institute/division:	**School of Engineering, Design & Technology, University of Bradford**
Email:	**p.d.coates@bradford.ac.uk**
Tel:	**(00) 44 1274 234540**

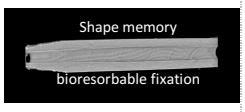
SUMMARY OF MY RELEVANT RESEARCH AREAS:

Structuring of polymers, composites and nanocomposites by processing; in-process measurements oriented polymers; biomaterials; specialist processing including micromoulding, solid phase orientation processing and reactive processing; polymer rheology; computer modelling of processing and products; expertise in running large scale interdisciplinary research programmes

通过加工技术达成聚合物，复合材料和纳米复合材的结构化;过程测量（光学，流变光，热量，超声波，光谱，散射;定向聚合物；生物材料；包括微米铸模成形，固相取向加工和反应处理等的专门加工;聚合物流变；加工及制品的计算机建模；运行大型跨学科研究项目的专长。

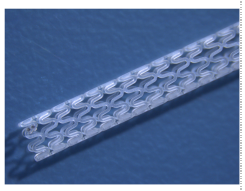
Primary Research interests:

Professor Phil Coates is a Physics graduate (Imperial College), with PhD research on solid phase deformation processing of polymers (Leeds). Phil is Director of the internationally recognised Polymer Interdisciplinary Research Centre (IRC).



Main research projects include:

Healthcare: • bioresorbable shape memory materials for bone and soft tissue fixation • micromoulded precision products • enhanced design & modelling of tools for minimally invasive surgery • novel extrusion manufacturing of drugs • joint repair;



Basic science: • Molecular architecture effects on processing • in-situ process characterisation of polymers • ultra-high strain rate rheometry • rheo-optical studies of extrusion and co-extrusion • SANS of deuterated melts • shear enhanced crystallisation • AFM of polymers, biomedical materials, tissue and nanocomposites;

Novel & efficient processing: • Micromoulding process developments and measurements • solid phase orientation processing – die drawing • processing of nanocomposites • multi-feed reactive extrusion grafting • fluid-assisted injection moulding • injection moulding control • extrusion quality control • additives compounding • thermal alloy tooling;

In-process measurements: include • process ultrasound, • at- process UV & Raman spectroscopy, • at-process colour measurement, • process energy, • temperature fields • rheo-optical, • in-situ beam studies of structure;

Modelling: • multi-scale modelling for nanocomposites • fibre orientation measurement and prediction in injection moulding • FEA of process and products

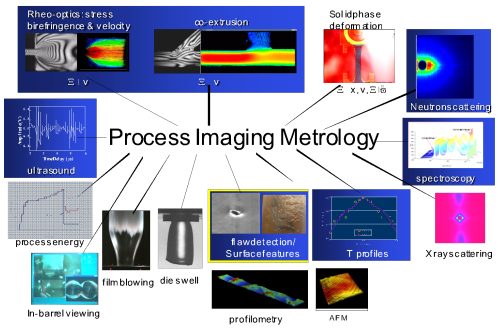
Topics in which you would like to develop collaborative research:

Tailored Polymers, polymer nanocomposites or polymer blends which can have their morphology developed during processing, to achieve properties which are suitable, for example, for medical devices and therapies e.g. (a) bone analogues, fixation systems, scaffolds, stents, drug eluting products,. Potential processes include: (i) micromoulding, (ii) injection moulding, (iii) extrusion, (iv) solid phase orientation; (v) reactive processing; with (vi) materials characterisation (during processing and off line) and (vii) computer modelling and control of quality.

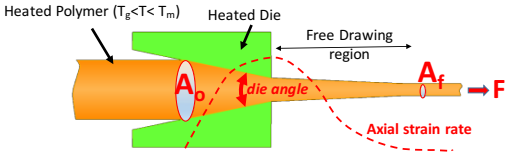
Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

Include: **China: Science Bridges China** projects with *Sichuan University (+MOST, NSFC, MoE international projects), *Beijing University of Chemical Technology, *Institute of Chemistry CAS Beijing, Institute of Applied Chemistry CAS Changchun; HKUST. * Bradford - Joint International laboratory. **UK:** Leeds, Durham, Sheffield, Newcastle, Nottingham, Queens Belfast, Oxford, Cambridge, Warwick, UCL. **Industry**: over 150 companies collaborating, including: Arterius, Autodesk, Invibio, Sabic, Sinopec, Smith & Nephew, Surgical Innovations, Xplore.

Relevant graphics, figures, pictures:

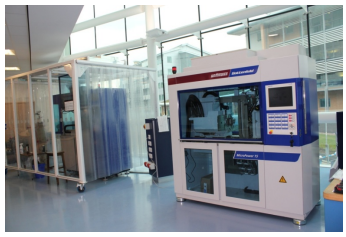


Some of the in-process measurements we undertake

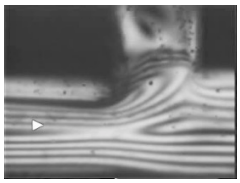


'Process structuring':

(i) Die drawing – solid phase orientation processing With Dr Fin Caton-Rose & team

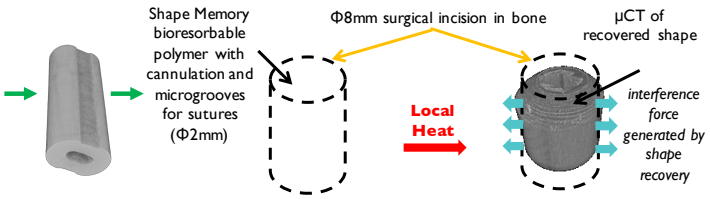


(ii) Micromoulding with Dr Ben Whiteside & team

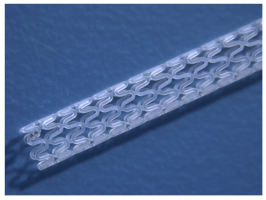


Rheo-optical: flow birefringence with Dr T Gough, Dr M Martyn

SOME MEDICAL/BIOMEDICAL RESEARCH AREAS:

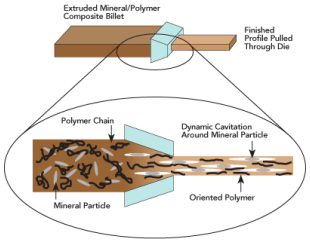


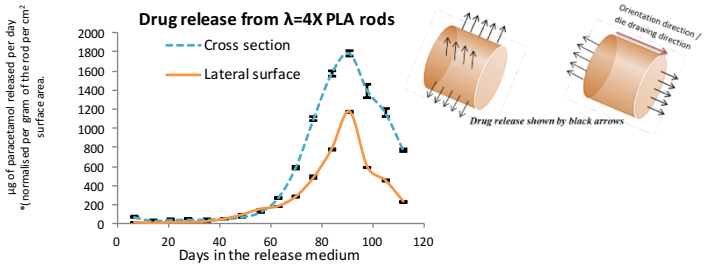
Shape memory polymers for tissue fixations



oriented polymer stents

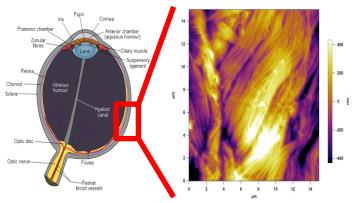
minimally invasive surgery devices





Oriented polymers for anisotropic drug delivery with Prof Paradkar & Dr Kelly)

Cavitated low density oriented polymers for structural products



Atomic Force Microscopy of collagenous tissue sclera, white of eye (Dr C Grant)

Publications and other outputs relevant to your interest in this programme

- Bent, L. R. Hutchings, R. W. Richards, T. Gough, R. Spares, P. D. Coates, I. Grillo, O. G. Harlen, D. J. Read, R. S. Graham, A. E. Likhtman, D. J. Groves, T. M. Nicholson and T. C. B. McLeish, Neutron-Mapping Polymer Flow: Scattering, Flow visualization and Molecular Theory, Science, 301, 1691-1695 (2003)
- A. L. Kelly, T. Gough, B. R. Whiteside, P D Coates, High Shear Strain Rate Rheometry of Polymer Melts, JAppPolySci, 114, 864–873, (2009)
- Li L; Mulvaney-Johnson L; Chen N; Wang Q; Coates PD Small scale injection moulding of modified poly(vinyl alcohol), 39 (9), 411- 418, 1465-8011, Plast Rubb Comp. 2010
- G-X Fei, C Tuinea-Bobe, D-X Li, G Li, B Whiteside, P D Coates and H-S Xia, Electro-activated surface micropattern tuning for microinjection molded electrically conductive shape memory polyurethane composites RSC Advances, 12/2013; 3(46):24132-24139. DOI: 10.1039/C3RA43640C 2013
- Z-Y Jiang, Y-T Wang, L-L Fu, B Whiteside, J Wyborn, K Norris, Z-H Wu, P D Coates, and Y-F Men. Tensile Deformation of Oriented Poly(ε-caprolactone) and Its Miscible Blends with Poly(vinyl methyl ether)Macromolecules, Vol. 46, No. 17, pp. 6981−6990; DOI: 10.1021/ma401052x. 2013
- Jiajia Xue, Rui Shi, Yuzhao Niu, Min Gong, Phil Coates, Aileen Crawford, Dafu Chen, Wei Tian, Liqun Zhang Fabrication of drug-loaded anti-infective guided tissue regeneration membrane with adjustable biodegradation property Colloids and Surfaces B: Biointerfaces,18March. DOI: 10.1016/j.colsurfb.2015.03.031, 2015
- Li, Zhengqiu ; Zhao, Xiaowen ; Ye, Lin ; Coates, Phil ; Caton-Rose, Fin ; Martyn, Michael, Structure and blood compatibility of highly oriented poly(l-lactic acid) chain extended by ethylene glycol diglycidyl ether. Polymer; 56; 523-534;DOI: 10.1016/j.polymer.2014.11.035,2015

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: **Hesheng Xia**

Position: **Professor & Deputy Director**

Institute/division: **State Key Lab of Polymer Materials Engineering, Sichuan University**

Email: **xiahs@scu.edu.cn**

Tel: **0086-28-85460535**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Polymer Micro/Nano-composites: Preparation and Processing

聚合物微、纳米复合材料的制备和加工

Primary Research interests:

In the past ten years, he has been conducting research work on polymer micro/nano-composites; ultrasound mechanochemistry, polymer materials for 3D printing

His main contributions are:

1. He devotes himself to solve the dispersion and structure control of inorganic nanoparticles such carbon nanotubes (CNTs) and graphene (GE) in the polymer matrix through ultrasonic irradiation. (1) the concept and method of ultrasound in-situ emulsion polymerization and bulk polymerization were established and well-dispersed polymer nanocomposites were prepared. This method can solve the dispersion problem of inorganic nanoparticels in the polymer matrix, as well as the interfacial interaction between inorganic nanoparticles and polymer; (2) He established ultrasonically exfoliation, latex mixing and in-situ reduction technology to prepare graphene/polymer composite. The rubber-grapehene composites with uniform dispersion or 3D interconnected graphene network of graphene can be obtained by this method. His findings illustrated the tremendous potential of graphene in natural rubber reinforcement.
2. He developed a novel approach, i.e. using CNTs-wrapped TPU composited powder, combined with the SLS 3D printing technology, to construct electrical conductive nanocomposite.
3. He synthesized a series of ultrasound mechanochemical responsive copolymers and proposed the novel mechanism on breaking copolymer micelle using a mechanochemical way. He established a new modality, i. e. high intensity focused ultrasound (HIFU) remotely controlled drug release.
4. He synthesized ultrasound-responsive polymer containing dynamic bond. Based on those novel materials, he proposed a novel concept and modality, i.e. remotely ultrasound controlled shape recovery and self-healing by employing the thermal effect and mechanochemical effect of ultrasound.

He has published 130 peer-reviewed papers with a citation of 2600 and owned 26 authorized patents. In 2006, he received the Second Grade Prize of National Technology Invention of China and the Third Grade Prize of Science & Technology of Sichuan Province. In 2002, he received the First Grade Prize of Technology Invention, Granted by Ministry of Education of China. His publication was highlighted by “Heart Cut” of ACS and was selected to feature in the RSC supplement news stories

Topics in which you would like to develop collaborative research:

Polymer/Graphene Nanocomposites

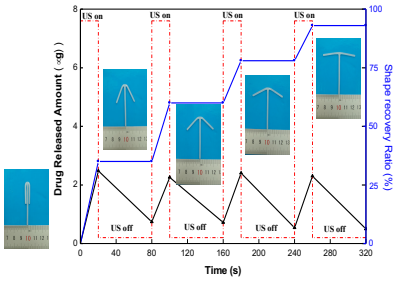
3-d printing of electrically-conductive nanocomposites

Shape Memory & self-healing Polymers

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

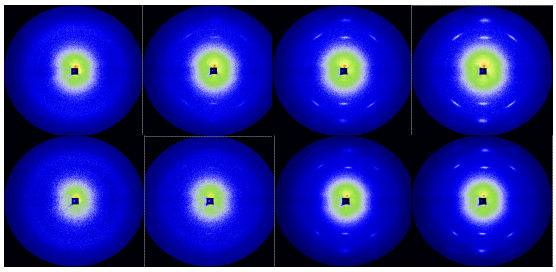
1. Polymer IRC, Bradford University
2. Sinopec Sichuan Vinylon Works, Chongqing, China
3. Southwest Hospital, The Third Military Medical University, Chongqing, China
4. Department of Chemistry, University of Sherbrooke, Canada
5. Institute of Composite and Biomedical Materials, National Research Council of Italy, Naples, Italy

Relevant graphics, figures, pictures:

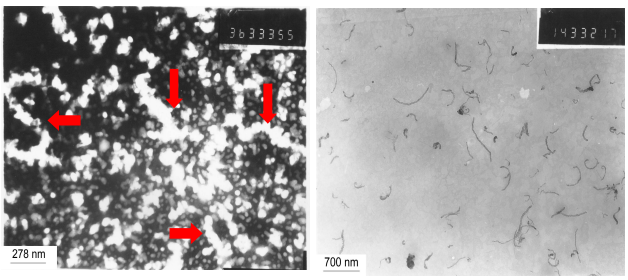


HIFU controlled shape memory polymer and drug release

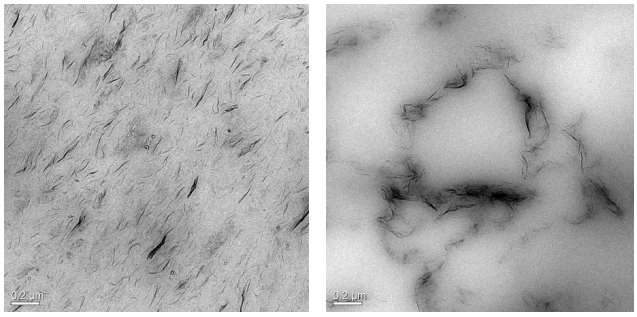
Electrical conductive and flexible PU/CNTs micro-molded parts



2D-XRD patterns of rubber (below) and rubber/GE composites (above) with increasing strains



Polymer/CNTs latex (left) and composite (right)



Rubber/graphene composite

Publications and other outputs relevant to your interest in this programme (up to 5)

1. Hesheng Xia, Yue Zhao, Rui Tong, Ultrasound-Mediated Polymeric Micelle Drug Delivery, Advances in Experimental Medicine and Biology, Therapeutic Ultrasound (book), 2016, 880, 365-384
2. Jian Zhao, Rui Xu, Gaoxing Luo*, Jun Wu, Hesheng Xia*, A Self-Healing, Re-moldable and Biocompatible Crosslinked Polysiloxane Elastomer, J. Mater. Chem. B, 2016, 4, 982—989
3. Qiang Bu, Yanhu Zhan, Fangfang He, Marino Lavorgna and Hesheng Xia*, Stretchable conductive films based on carbon nanomaterials prepared by spray coating, Journal of Applied Polymer Science , 2016, 133(15), 43243
4. Shuchi Liao, Tianliang Zhai, Hesheng Xia*, Highly adsorptive graphene aerogel microsphere with center-diverging microchannels structure, J. Mater. Chem. A, 2016, 4(3), 1068-1077
5. Fayong Li, Chuan Xie, Zhengang Cheng, Hesheng Xia*, Ultrasound responsive block copolymer micelle of poly(ethyleneglycol)–poly(propylene glycol) obtained through click reaction, Ultrasonics Sonochemistry, 2016, 30, 9-17
6. Guo Li, Qiang Yan, Hesheng Xia*, and Yue Zhao*, Therapeutic-Ultrasound-Triggered Shape Memory of a Melamine-Enhanced Poly(vinyl alcohol) Physical Hydrogel. ACS Appl. Mater. Interfaces, 2015, 7 (22), 12067–12073.
7. Dongxu Li, Guoxia Fei, Hesheng Xia*,, Paul E. Spencer* and Philip D. Coates, Micro-contact reconstruction of adjacent carbon nanotubes in polymer matrix through annealing-Induced relaxation of interfacial residual stress and strain. Journal of Applied Polymer Science, 2015, 132(33), 1-11.
8. Dongxu Li, Tianliang Zhai, Qichun Gong, Guoxia Fei and Hesheng Xia*, Effect of Processing Temperature on the Structure and Properties of Microinjection Molded Thermoplastic Polyurethane/Multi-walled Carbon Nanotube Composites, Plastics Rubber and Composites: Macromolecular Engineering, 2015, 44(5), 197-205. (Alan Glanville Award, Institute of Materials, Minerals and Mining).
9. Ning Yan, Filomena Capezzuto, Giovanna G. Buonocore, Marino Lavorgna*, Hesheng Xia*, and Luigi Ambrosio, Gas-Barrier Hybrid Coatings by the Assembly of Novel Poly(vinyl alcohol) and Reduced Graphene Oxide Layers through Cross-Linking with Zirconium Adducts. ACS Appl. Mater. Interfaces, 2015, 7 (40), 22678–22685.

BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: **Dr Peter Twigg**

Position: **Reader in Medical Engineering**

Institute/division: **Medical Engineering, School of Engineering, University of Bradford**

Email: **p.twigg@bradford.ac.uk**

Tel: **+44 (0) 1274 236183**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Brief summary of your research areas, in English *just a short paragraph please*

Biomaterials, particularly hydrogels and cell-conducting materials for soft tissue repair
Biomechanics at human, tissue and cellular scales, particularly dynamic mechanical analysis
Surface engineering of medical devices

Brief summary of your research areas, in Chinese *we will translate this for non-Chinese speaking UK participants*

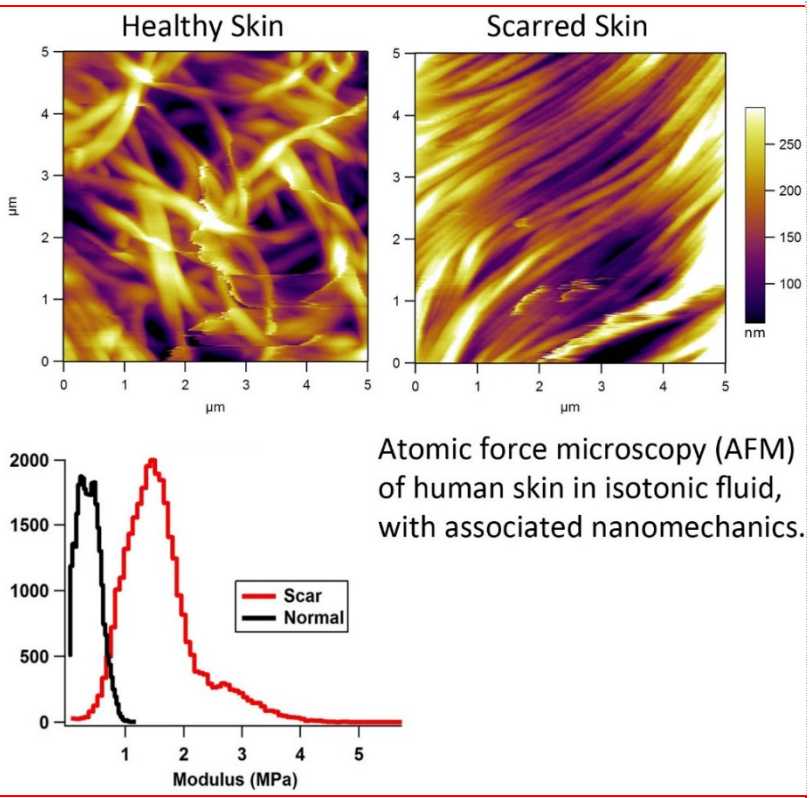
Primary Research interests:

Tissue mechanics - soft tissue characterisation, structure-property relationships, dynamic mechanical analysis, multi-scale modelling

Biomaterials - development of tissue replacement materials, biotribology, surface engineering, orthopaedics

Tissue engineering scaffold materials – electrospinning, hydrogel scaffolds, porous structures, functional scaffolds

Cell-surface interactions - surface characterisation, cell adhesion, cell guiding structures, anti-microbial surfaces, biofilm formation, bio-integration of implants



Atomic force microscopy (AFM) of human skin in isotonic fluid, with associated nanomechanics.

Topics in which you would like to develop collaborative research:

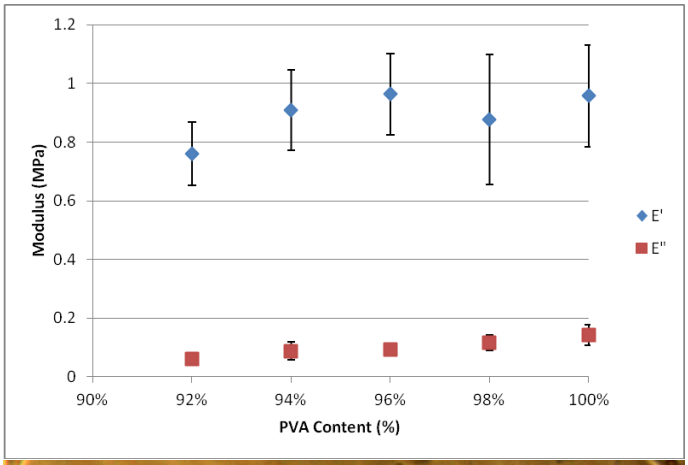
The use of biomaterials in tissue repair tends to rely on precision engineered implants that are very different to the tissues they replace or repair. This can involve procedures that remove significant amounts of healthy tissue, for example total hip replacement. A precision engineering approach can also lead to problems due to stress shielding, wear and immune response.

Our group has been working on alternative approaches that use materials with mechanical properties much closer to those of natural tissues. These open up possibilities for conservative repair and replacement treatments, and less disruption to the function of the surrounding tissues.

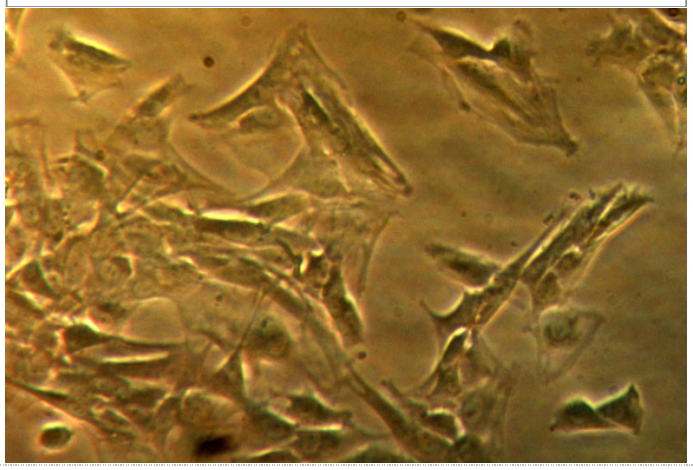
Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

State Key Laboratory of Polymer Materials Engineering, Sichuan University – medical polymers
Institute of Chemistry, Chinese Academy of Sciences, Beijing – hydrogel development
Trauson Medical Instrument Co. (China) - development of orthopaedic implants
Finsbury Orthopaedics (UK) - collaborative work on joint replacement lubrication
DePuy (UK)- surface engineered joint replacements
Ion Bond (UK) - surface engineering medical devices

Relevant graphics, figures, pictures:



Variation of storage and loss modulus (at a physiologically relevant frequency and compressive stress) with PVA content for a PVA-PVP freeze-thaw hydrogel system.



Chondrocyte attachment on a PVA-PEG hydrogel after 6 hours. Cells show rapid surface spread and migration, with much slower migration into the hydrogel bulk.

Publications and other outputs relevant to your interest in this programme (up to 5)

'The Effect of Polysialic Acid Expression on Glioma Cell Nano-mechanics', C.A. Grant, P.C. Twigg, R.F. Saeed, G. Lawson, R.A. Falconer and S.D. Shnyder, BioNanoScience, 6 (2016) 81-84

'Tattoo Ink Nano-Particles in Skin Tissue and Fibroblasts', C.A. Grant , P.C. Twigg, R. Baker and D.J. Tobin, Journal of Nanotechnology, 6 (2015) 1183-1191

'Pseudo-Static and Dynamic Nano-Mechanics of the Tunica Adventitia in "Elastic" Arteries using Atomic Force Microscopy', C.A. Grant, P.C. Twigg, ACS Nano, 7 (2013) 456–464

'Static and dynamic nano-mechanical properties of human skin tissue using atomic force microscopy: Effect of scarring in the upper dermis', C.A. Grant, P.C. Twigg and D.J. Tobin, Acta Biomaterialia, 8 (2012) 4123-4129

'Polyvinyl alcohol hydrogel as a biocompatible visco-elastic mimetic for articular cartilage', C. Grant, P. Twigg, A. Egan, A. Moody, A. Smith, D. Eagland, N. Crowther and S. Britland, Biotechnology Progress 22 (2006)1400-1406

Science Bridges China Research Profile

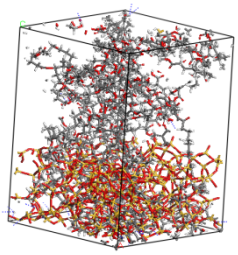
Name: **Liqun Zhang（张立群）**
Position: **Professor/Dean of College/Head of Key Lab of Beijing City**
Institute/division: **Beijing University of Chemical Technology, Center of Advanced Elastomer Materials, Key Lab of Beijing City on Polymer**
Email: **zhanglq@mail.buct.edu.cn**
Tel: **0086-10-64423312**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

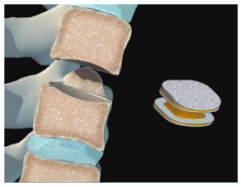
Polymer Nanocomposites; Bioelastomer; Polymer Processing; Rubber Science and Technology

聚合物纳米复合材料；生物弹性体；聚合物加工；橡胶材料科学与工程

Primary Research interests:



1. With the goal of developing the biomaterials applications such as drug delivery matrix materials, tissue engineering scaffolds materials and organ-repairing materials, the research focuses on preparation of novel polymer materials with high elasticity and various biofunctionality. Main research fields are molecular design, synthesis method, structure and property of novel bioelastomer materials, nano-reinforcement and nano-modification of bioelastomer materials, the preparation methods of biodegradable porous scaffolds. Attention is also paid to the time-dependent and environment-dependent properties of the structure and biofunctionality on the bioelastomers as well as cooperation with the hospital on animal experiments and clinical application of bioelastomer materials, etc.
2. Based on the requirement of nation development strategy, such as resource, environment, energy, and so on, we study on the recycling science & technology of the cross-linked rubber, preparation science & technology of energy-saving/ environment friendly/recyclable thermoplastic elastomer, preparation science & technology of advanced material aiming at oil-saving tire. Among these, we emphasize on: science of rubber dynamic vulcanization, science of the crosslink and de-crosslink of rubber, and science of the viscoelasticity and hysteresis of rubber at broad vibration frequency range, and effect of interface on poly-phase, multi-component rubber compounds, and so on.



3. Study on filled elastomer matrix with both high-elastic performance and specific functions such as sound property, luminescence property, electrical conductivity, magnetic property. Focus on the design and development of filler structure and interface structure, the relationship of filler structure and functional response, the relationship of functions and stress, strain, temperature, and other outside fields, and its evolution with time. Develop functional elastomer composites with low-cost and high-performance, develop relevant whole set of product processing technology.
4. Focus on describing and characterizing multi-level and multi-scale structures of nano-dispersion reinforced rubber composites, developing methods of forming random or ordered nano-dispersed structures in rubber matrix, investigating thermodynamics and kinetics of nano dispersion and aggregation using statistical mechanics and molecular simulation methods, mechanism of nano-reinforcement (e.g. modulus, stress, strain, strength), relationship between the complex structure and performance of the nanocomposites, developing industrial low-cost and high- performance nano reinforcement technology and nano-composites.

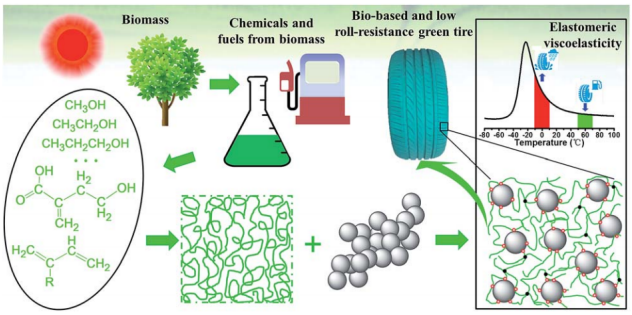
Topics in which you would like to develop collaborative research:

- **Bioelastomer and Water Gels for drug delivery and tissue engineering;**
- **Delicate artificial device for medical application through polymer technology;**
- **Completely biobased polymer blends and composites for health care and environment.**

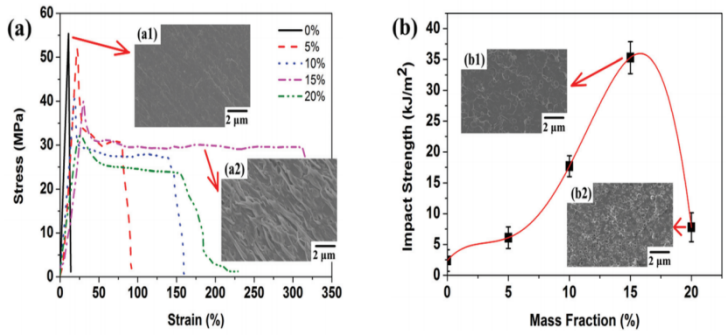
Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

1. Collaborating with over 20 China Enterprises for Rubber Science and Technology
2. Academic Collaboration with Bradford University, Tokyo University of Technology, University of Massachusettes.

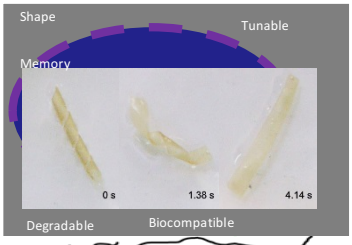
Relevant graphics, figures, pictures:

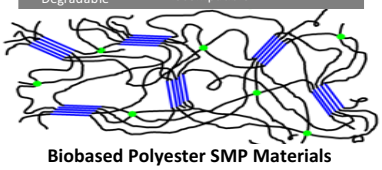


The Concept and routine of Biobased Engineering Elastomer (BEE)

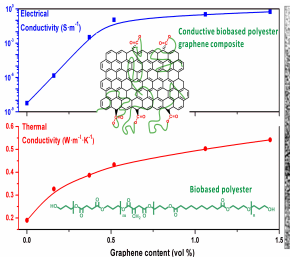


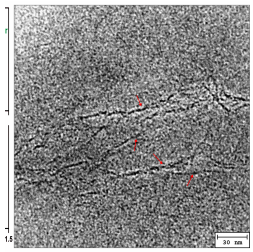
BEE highly toughened PLA blends-totally biobased

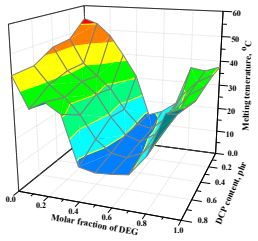




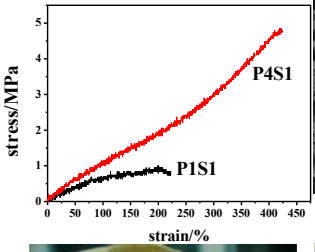
Biobased Polyester SMP Materials

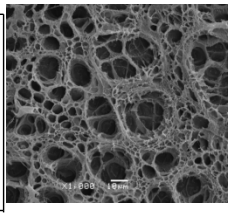




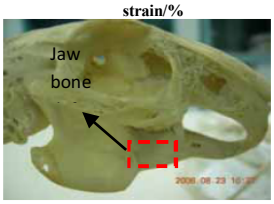


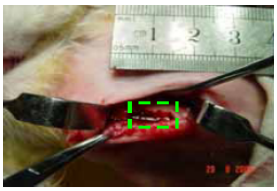
The concurrently increased electrical and thermal conductivity are observed and attributed to the well-dispersion of graphene in BE matrix





Starch/PVA/ HA system for GTR membrane





Publications and other outputs relevant to your interest in this programme (up to 5)

1. Quanyong Liu, Liqun Zhang, et al. Synthesis, preparation, in vitro degradation and application of novel degradable bioelastomers-A review. Progress in Polymer Science, 2012, 37(5):715-765
2. Jiajia Xue, Phil D Coates, Rui Shi, Liqun Zhang, et al. Drug loaded homogeneous electrospun PCL/gelatin hybrid nanofiber structures for anti-infective tissue regeneration membranes. Biomaterials, 2014, 35(34):9395-9405
3. Jiajia Xue, Liqun Zhang, Yuri Lvov, et al. Electrospun microfiber membranes embedded with drug-loaded clay nanotubes for sustained antimicrobial protection. ACS Nano, 2015, 9(2):1600-1612
4. Xiaoran Hu, Hailan Kang, Liqun Zhang, et al. Direct copolycondensation of biobased elastomers based on lactic acid with tunable and versatile properties. Polymer Chemistry, 2015, 6(47):8112-8123
5. Weiwei Lei, Thomas P. Russell, Runguo Wang, Liqun Zhang, et al. High performance bio-based elastomers: energy efficient and sustainable materials for tires. 2016, 4(34): 13058-13062

Research Profile

Name: **Prof. Lin Ye**

Position: **Professor**

Institute/division: **State Key Laboratory of Polymer Materials Engineering**
Polymer Research Institute of Sichuan University

Email: **yelinwh@126.com**

Tel: **0086-28-85408802**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Oriented Self-reinforcing polymer materials, Polymer/Graphene nano-composites, Polymer hydrogels, Engineering plastics

取向自增强高分子材料设计与制备，聚合物/石墨烯纳米复合材料制备及应用，高性能聚合物凝胶结构设计与制备，高性能工程塑料结构设计与制备

Primary Research interests:

Oriented self-reinforcing polymer materials: Structure and blood/bio-compatibility of highly oriented poly(lactic acid) produced by solid hot stretching; Self-reinforcing polyoxymethylene with highly mechanical and thermal-conductive properties; Oriented nylon 6 with improved thermal and hydrothermal stability

Polymer/Graphene nano-composites: Functionalization of grapheme; Chitosan/GO nano-composite hydrogel for controlled pH- and glucose-responsive drug release application; Nylon 6/GN nano-composites with highly improved tribological properties, electrically conductive property and thermal stability; Polyvinyl alcohol(PVA)/GO nano-composite hydrogel for heavy metal ion removal

Polymer hydrogels: Polyvinyl alcohol hydrogel for wound dressings, nerve conduit and articular cartilage application; Chitosan hydrogel for controlled pH- and glucose-responsive drug release application; Polyvinyl alcohol(PVA) hydrogel immobilized with microorganism applied in waste water treatment; Starch-based superabsorbent polymer

Topics in which you would like to develop collaborative research:

Development of poly (vinyl alcohol) based hydrogels for potential use as an articular cartilage replacement through 3D bio-printing technology

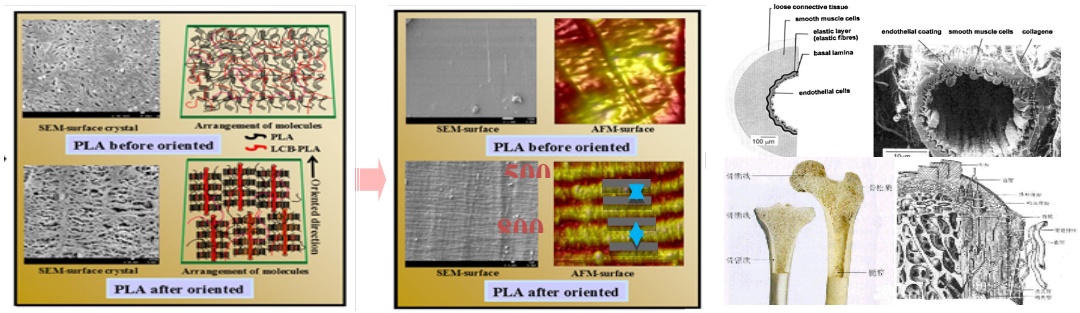
The joint replacement orthopedic surgery has been accomplished for over 30 years mainly due to the employment of ultra-high molecular weight polyethylene (UHMWPE). However, the excessive wear of UHMWPE can lead to bone dissolution, causing eventual failure of prosthetic replacement. Due to high elastic modulus, good biocompatibility, non-toxicity and bio-tribological properties, poly (vinyl alcohol) (PVA) hydrogels have been considered as excellent replacement of cartilaginous tissues. However, PVA hydrogels may have poor mechanical properties by lack of adequate compression and shear resistance to withstand severe loading applied to articular surface. This research aims to develop PVA based hydrogels with high mechanical and bio-tribological properties for potential use as cartilage replacement. By molecular structure /network structure control and in situ crosslinking technology, the reinforcing and toughening of PVA hydrogel will be realized, and the wear resistance and self-lubrication property will be improved. Furthermore, the 3D gel bio-printing technology will be studied and applied to the manufacture of PVA-based hydrogel, which will be significantly important for direct cartilage repair with high precision.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

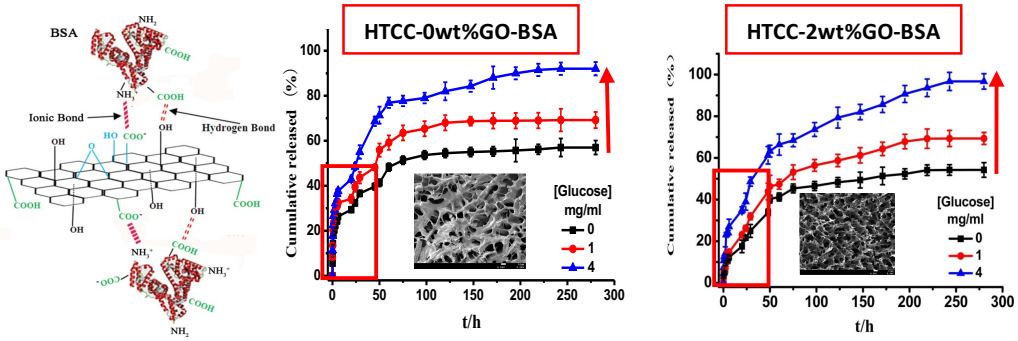
- Sub-project of Science Bridge China Project (Cooperation with Bradford University)
- International Scientific and Technological Cooperation Project of Sichuan Province (Cooperation with Bradford University)

Relevant graphics, figures, pictures:

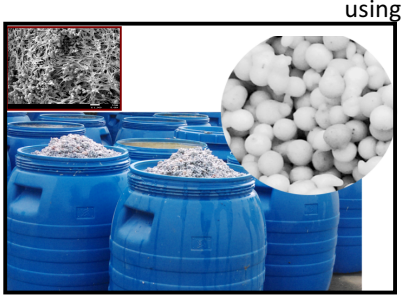
Use this area to show pictures or scientific figures which illustrate your research



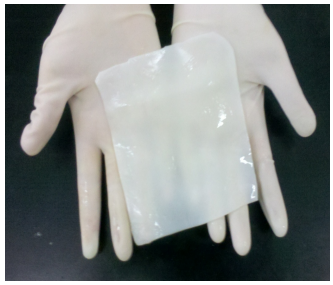
Formation mechanism of micro-grooves and bionic structure of oriented LCB-PLA

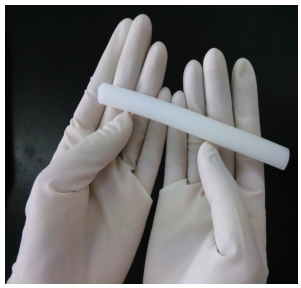


Controlled pH- and glucose-responsive drug release behavior of chitosan based nano-composite hydrogels by using graphene oxide as drug nano-carrier



Industrial product of PVA hydrogel immobilized with microorganism





PVA hydrogel for wound dressing and nerve conduit application

Publications and other outputs relevant to your interest in this programme (up to 5)

1. Xue Zou, Xiaowen Zhao*, Lin Ye, Synthesis of cationic chitosan hydrogel and its controlled glucose-responsive drug release behaviour. Chemical Engineering Journal, 2015, 273: 92-100
2. Zhe Lian, Lin Ye*, Synthesis and properties of carboxylated poly(vinyl alcohol) hydrogels for wound dressings, Journal of Polymer Research, 2015, 22(5): 72
3. Xiaowen Zhao, Lin Ye*, Phil Coates, Phil Caton-Rose, Michasel Martyn, Structure and blood compatibility of highly oriented poly(lactic acid)/thermoplastic polyurethane blends produced by solid hot stretching. Polym. Adv. Technol., 2013, 24: 853–860
4. Chengjie Li, Meng Xiang, Lin Ye, Intercalation behavior and orientation structure of graphene oxide/polyethylene glycol hybrid material. RSC Advances, 2016, 6(76): 72193-72200
5. Xiaowen Zhao, Lin Ye*, Structure and properties of highly oriented polyoxymethylene/multi-walled carbon nanotube composites produced by hot stretching. Composites Science and Technology, 2011,71: 1367

Research Profile

Name: **Anant Paradkar**
Position: **Professor and Director,**
Institute/division: **Centre for Pharmaceutical Engineering Science**
Email: **A.Paradkar1@Bradford.ac.uk**
Tel: **+44-1274-233900**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

My research interest is pharmaceutical formulation and process development. I work with an interdisciplinary team comprising engineers, physicists, pharmacists. My main interest is development of innovative processes and products for pharmaceutical applications especially involving polymers. Another major focus is understanding processes and products through use of process analytical technology.

我的研究兴趣是药剂的配方和工艺开发。我和一个跨学科的团队一起工作，其中包括工 程师，物理学家和药剂师。我的主要兴趣是开发创新过程和制药应用产品，尤其是涉及聚合物的产品。另一个主要重点是通过使用过程分析技术而 了解工艺和产品。

Primary Research interests:

Process Development: Currently my research focus is on non-infringing processing technologies for pharmaceuticals with special emphasis on Hot Melt Extrusion (HME) and Ultrasound Assisted processing. Our interdisciplinary team has developed the application of HME for co-crystallization. This solvent-free continuous technology offers many advantages and easy for scale-up and commercialization. In process development we also focus on process optimization and characterization of process related properties like extensional rheology. We have received £ 500k funding from EPSRC for this research.

Formulation Development: In the area of formulation development my focus is poorly soluble drug and nutraceutical molecules. We develop amorphous and liquid crystalline systems different purposes.

The novel drug delivery concepts are also extended to molecules from natural products. We are developing nanoparticulate delivery systems for treatment of neurodegenerative conditions, cancers and endometriosis.

Process Analytical Technology: The interdisciplinary group provides us with strong engineering expertise required for process analytics. Application of in-line measurement systems are being used to understand the mechanisms of novel products developed and process optimization.

Topics in which you would like to develop collaborative research:

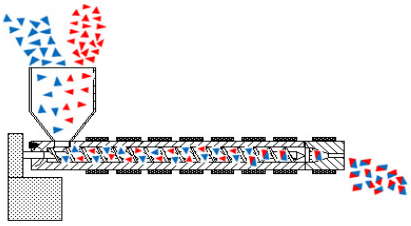
a. **Polymeric drug delivery systems: Targeted, Structured, controlled delivery, stimuli sensitive systems, microneedles, transdermal and bioadhesive patches, solid dispersions, drug eluting stents.**
b. **Innovative technologies for pharmaceutical processing: Spray drying, Ultrasound, magnetic arrays or microwave based technologies.**
c. **Process Analytical Technologies for pharmaceutical applications: use of vibrational spectroscopy, ultrasound attenuation and velocity measurement, rheology.**

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

1. Ultrasound assisted processing of pharmaceuticals: Professor Guo, Chengdu University
2. Nanoparticulate curcumin for Alzheimer based on using enhancers based on Traditional Chinese System of Medicine (TCM). : Dr Yilin, Changzhou Public Hospital and Professor Hu, Yilin University.
3. Ultrasound assisted processing: Professor Jarkko Ketolainen, Kuopio University, Finland
4. Rheology of liquid crystalline systems: Dr Guruswamy and Dr Suresh Bhat, National Chemical Laboratory , Pune, India.
5. Analytical techniques: Professor K R Mahadik, Bharati Vidyapeeth University, Pune
6. Green processing technologies: Professor G D Yadav, University Institute of Technology, Mumbai, India.

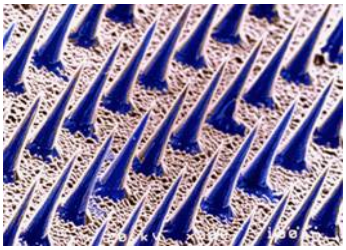
Relevant graphics, figures, pictures:

Drug Co-former

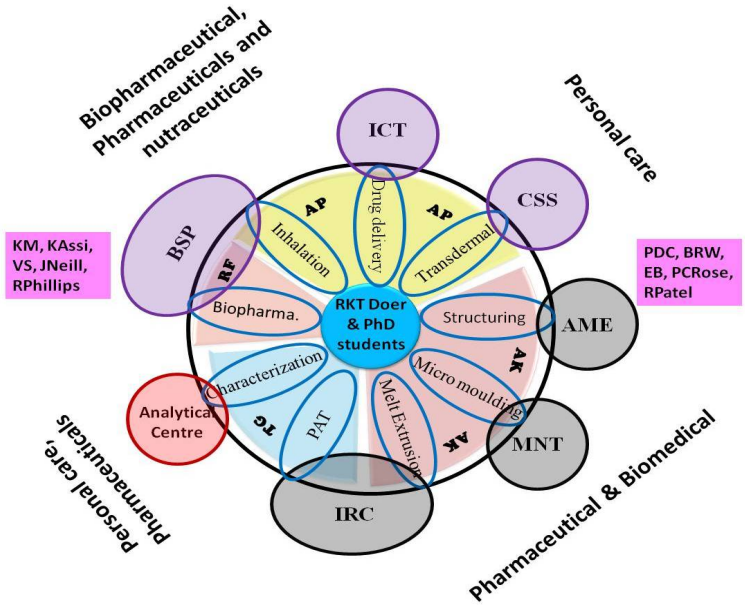


co-crystals

Hot melt extrusion co-crystallisation Technology



Microneedles



Centre for Pharmaceutical Engineering Science

Publications and other outputs relevant to your interest in this programme

Patent:
Anant Paradkar, Adrian Kelly, Phil Coates, Peter York. Method and Product; PCT/GB2009/050924; 27/07/2009 (WO/2010/013035; 04/02/2010)

Papers:

- Sameer Ketkar, Sudhir K. Pagire, N. Rajesh Goud, Kakasaheb Mahadik, Ashwini Nangia, and Anant Paradkar Tracing the Architecture of Caffeic Acid Phenethyl Ester Cocrystals: Studies on Crystal Structure, Solubility, and Bioavailability Implications Cryst. Growth Des., Article ASAP (accepted 19th August 2016) DOI: 10.1021/acs.cgd.6b00759
- Kulkarni, C., Wood, C., Kelly, A.L., Gough, T., Blagden, N., Paradkar, A. Stoichiometric Control of Co-Crystal Formation by Solvent Free Continuous Co-Crystallization (SFCC) (2015) Crystal Growth and Design, 15 (12), pp. 5648-5651.
- Wenting Bao, Hong Wu, Shaoyun Guo, Anant Paradkar, Adrian Kelly, Elaine Brown, Phil Coates Effect of Ultrasound on Molecular Structure Development of Polylactide Polymer-Plastics Technology and Engineering 06/2014; 53(9):927-934. DOI: 10.1080/03602559.2014.886062, 2014
- Ravindra Dhumal, Adrian Kelly, Phil Coates, Peter York, Anant Paradkar . 2010. Cocrystalization and simultaneous agglomeration using hot melt extrusion. Pharm. Res. 27, 2725-2733
- Rohit Mulik. Jukka Monkkonen, Risto Juvonen, Kakasaheb Mahadik, and Anant Paradkar. 2010. ApoE3 Mediated Poly(butyl) Cyanoacrylate Nanoparticles Containing Curcumin: Study of Enhanced Activity of Curcumin against Beta Amyloid Induced Cytotoxicity Using In Vitro Cell Culture Model. Molecular Pharmaceutics, 7 (3),815- 825
- Suyog Aher, Ravindra S. Dhumal, Kakasaheb Mahadik, Anant R. Paradkar , Peter York. 2010. Ultrasound assisted cocrystallization from solution (USSC) containing a non-congruently soluble cocrystal component pair: Caffeine/maleic acid. Eur. J. Pharm. Sci. 41, 597-602
- Dhumal, RS, Kelly, AL, York, P, Coates, PD, Paradkar, A Cocrystalization and Simultaneous Agglomeration using Hot Melt Extrusion, Pharmaceutical Research 27 2725-2733 DOI:10.1007/s11095-010-0273-9 (2010)

中英科技桥

Science Bridges China Research Profile

Name: **Jiwen Zhang**
Position: **Professor**
Institute/division: **Centre for Drug Delivery Systems, Shanghai Institute of Materia Medica, Chinese Academy of Sciences**
Email: **jwzhang@simm.ac.cn**
Tel: **+86-21-20231980**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Prof. Dr. Jiwen Zhang has carried out the interdisciplinary research by establishing cooperation with research team at home and abroad. Aiming at the evaluation of DDS, he has established the pharmacokinetics theory for the sustained and controlled-release systems, putting forward the quantitative method for optimizing the formulation of the sustained and controlled-release systems, and has designed new formulation such as biomimetic DDS. Pointing at the complexity of the structure of pharmaceutical dosage forms, his team utilized primarily the synchrotron radiation light facility to establish quantitative methods for characterizing the irregular and dynamic structure of DDS. Novel cage-like tablet and the osmotic pump with new structures have been designed. His team has studied the release mechanisms associated with kinetic rate constants of supramolecular DDS by HPLC, SPR and SPRi as well as prediction by molecular simulation. He and his team are working on Structure Pharmaceutics for scales from molecule to dosage forms.

Primary Research interests:

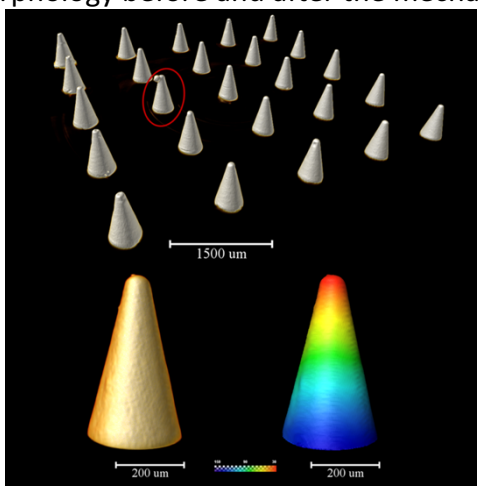
My research interests are mainly focused on the pharmacokinetics of the drug delivery systems (DDS), including new theories and methods for the pharmacokinetics of the sustained/controlled release dosage forms, pharmacometrics for the multiple release kinetics of the traditional Chinese medicines (TCMs), and computational pharmaceutics.

Topics in which you would like to develop collaborative research:

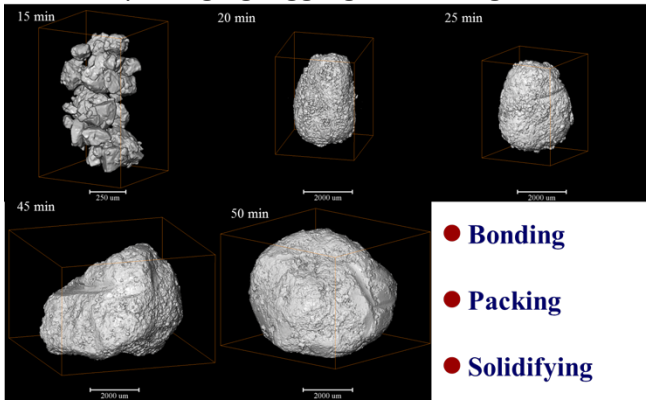
Smart drug delivery systems with advanced materials; Architecture of DDS and materials.

Collaborative Research with University of Bradford:

1. 3D Structural Investigation of Micro Needle Array, Xianzhen Yin, Karthik Nair, Ben Whiteside, Jiwen Zhang. SR-μCT makes it possible to characterize the morphology of micro-needle arrays and each single needles. With the high resolved structure of micro-needles, the diameter at each point has been obtained. For each micro-needle, about 10 million values have been calculated, then the diameter distribution was mapped with the morphology model. The established quantitative characterization methodology will be powerful for the evaluation of morphology before and after the mechanical and in vivo experiments.



2. Mechanism for formation and internal structure of Lactose-PEG 6000 granules obtained by Hot Melt Granulation, Xianzhen Yin, Niten Jadav, Aniket Sabnis, Anant Paradkar, Jiwen Zhang. SR-μCT as a non-destructive and sensitive detection technology, makes it possible to detect the composition of single granule or particle and determine the distribution of PEG and Lactose. The 3D structures of granules at different high speed shared time show the initial packaging of lactose crystal particles at the early stage and the aggregation pattern in big size granules. With the high resolved structure of granules, the mechanism and growth behaviors of packaging, aggregation and granulation can be studied.



3.Two extramural Ph.D. students to be graduated this year.

- Mr. Xianzhen Yin, supervised by Prof. Peter York, Dr. Qun Shao, Prof. Jiwen Zhang, Structure Pharmaceutics Based on Synchrotron Radiation X-Ray Micro-Computed Tomography, From Characterization to Evaluation and Innovation of Pharmaceutical Structures, 2016.

- Mr. Zhen Guo, supervised by Prof. Laurence Patterson, Dr. Qun Shao, Prof. Jiwen Zhang, Insights of Taste Masking from Molecular Interactions and Microstructure of Microspheres, 2016.

Guangxian Li

Position:

Professor of College of Polymer Science and Engineering,

Sichuan University

Executive vice-president of Sichuan University

Director of the State Key Laboratory of Polymer Materials Engineering

Email address: guangxianli@scu.edu.cn

Educational & Academic Background:

Prof Guangxian Li got his PhD degree on the polymer physical chemistry at Fudan University Shanghai China in 1989 and undertook his postdoctoral work on the miscibility of polymer blends at Heriot-Watt University UK from 1990 to 1993. Since 1993 he is a full professor of Sichuan University.

Research interest:

- ∞ Structure and properties of multicomponent polymeric materials
- ∞ Degradation and stability of polymeric materials
- ∞ New technologies for polymer processing

Yunbing Wang

National Engineering Research Centre for Biomaterials
Sichuan University

Email: mailto:yunbing.wang@scu.edu.cn

Professor Yunbing Wang is the Director of Chinese National Engineering Research Center for Bomaterials and Vice President of Chinese Society for Biomaterials. He is an inventor of more than 200 US and international patents leading to several well-known commercialized medical device products in the world. Before taking his current position, he worked at different medical device companies including Medtronic, Boston Scientific, Abbott and CooperVision, and worked as the leading inventor and technical leader of several products, including fully biodegradable stent for cardiovascular disease treatment and artificial pancreas device system for diabetes treatment.

Profssor Wang's current research interest is in the area of advanced biomaterials and implantable medical device development for the treatment of cardiovascular disease, diabetes, cancer and eye disease, etc.

Research Profile

Name:	**Chuhong Zhang**
Position:	Ph. D & Prof.
Institute/division:	State Key Lab of Polymer Materials Engineering, Polymer Research Institute, Sichuan University,
Email:	**chuhong.zhang@gmail.com**
Tel:	+86-28-85402819, +86-18200158685

SUMMARY OF MY RELEVANT RESEARCH AREAS:

polymer based nanocomposites, ionically conducting polymeric materials.

聚合物基纳米复合材料离子导电聚合物材料

Primary Research interests:

1. Established a novel method to prepare polymer nanocomposites with excellent conducting, magnetic, or optical properties by ultrasonic irradiation. By taking advantages of the multieffect of ultrasound, i.e., dispersion, crushing, activation and initiation, ultrasonic irradiation was first used to realize the polymerization of monomers on the surface of nanoparticles, offering a new route to prepare composites containing stable nanoparticles encapsulated by polymers.(Eur. Polym. J., 38, 1769, 2002; J. of Appl. Polym. Sci., 80, 1478, 2001)

2. Exploring the relationship between the structure and dynamic properties in bulk and nanoparticle filled polymers using neutron scattering, particularly, quasielastic neutron scattering (QENS), and revealing the mechanism of the segmental motions of polymer chains within different temperature ranges as well as the influence of the nanoparticles on the segmental motions.(Phys. Rev. Lett., 90, 058301, 2003; Chem. Phys., 328, 53, 2006)

2. Preparing novel solid crystalline polymer electrolytes with high ionic conductivity, investigating their conduction mechanism and application in lithium and sodium ion batteries: reported PEO_8:$NaAsF_6$, the first sodium conducting crystalline polymer electrolyte, which has a conductivity 1.5 orders of magnitude higher than PEO_6:$LiAsF_6$ at 25°C and has been successfully applied in sodium batteries (Nature Materials, 8, 580, 2009); reported a new class of crystalline small-molecule electrolytes which are soft solids but, unlike polymers, are based on short-chain molecules that do not entangle and are monodispersed (Ang. Chem. Int. Ed., 46, 2848, 2007; JACS, 129, 8700, 2007); proved that doping, modifying chain ends, changing molecular weight of polymers etc are efficient ways in enhancing the conductivity of crystalline polymer electrolytes (JACS, 127, 18305, 2005; J. Mater. Chem., 17, 3222,2007).

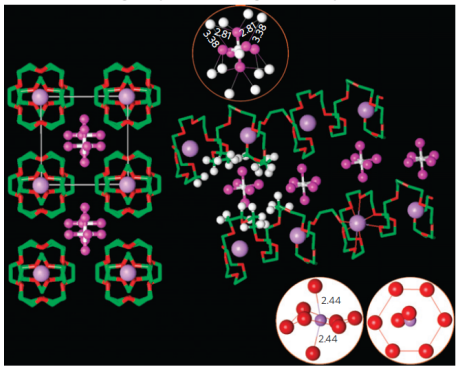
Topics in which you would like to develop collaborative research:

- Polymer nanocomposites used for medical applications
- Polymer solid electrolyte used for Lithium/sodium battery

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

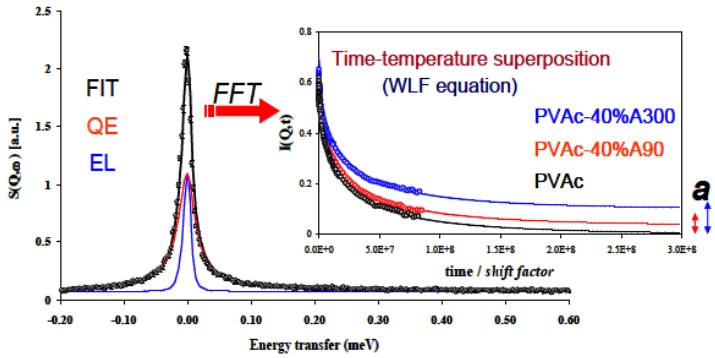
MRC-MOST Joint international project with Bradford, Sheffield, Durham Universities and ICCAS on Biomaterials for Joint Soft Tissue Repair - Improving Health in Older Age.

Relevant graphics, figures, pictures:

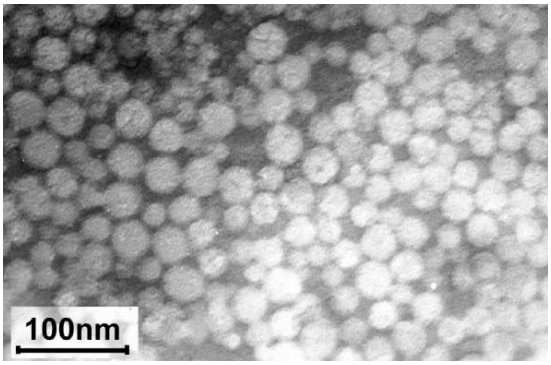


The first sodium conducting crystalline polymer electrolyte, PEO_8: $NaAsF_6$, which has a conductivity 1.5 orders of magnitude higher than PEO_6:$LiAsF_6$ at 25°C

The structure of PEO_8: $NaAsF_6$, from the single-crystal data collected at 25 °C, Left: view of the complete structure (hydrogens are not shown). Right: fragment of the structure showing neighbouring tunnels with dedicated anions (only hydrogens closest to the leftmost AsF_6^- anion are shown). The circular insets show the immediate environment of the anion and the cation, with the numbers indicating selected F–H and Na–O distances. Purple, sodium; red, oxygen; green, carbon; magenta, fluorine; white (small circle), arsenic; white (large circle), hydrogen
(Chuhong Zhang, Stephen Gamble, David Ainsworth, Alexandra M. Z. Slawin, Yuri G. Andreev and Peter G. Bruce, Nature Materials, 8, 580, 2009)



QENS spectra of PVAc containing 40 wt% A300 as measured on IRIS at 478K and Q = 1.45 $Å^{-1}$, the fit to the experimental data including a quasielastic and an elastic contributions. Inset: overlapped Intermediate scattering function I(Q,t) data of bulk and nanoparticle filled PVAc as well as their fits at 1.58 $Å^{-1}$ (reference temperature: 478 K).



TEM micrograph of PS latex obtained through ultrasonically induced microemulsion polymerization of St (Chuhong Zhang, Qi Wang, Hesheng Xia, Guihua Qiu, European Polymer Journal 38, 1769, 2002)

Publications and other outputs relevant to your interest in this programme (up to 5)

- Zhuo Liu, Yinghong Chen, Weiwei Ding, Chuhong Zhang Filling behavior, morphology evolution and crystallization behavior of microinjection molded poly(lactic acid)/hydroxyapatite nanocomposites, Composites Part A: Applied Science and Manufacturing Volume 72, May 2015, Pages 85–95 10.1016/j.compositesa.2015.02.002
- Jing Zheng, Yousong Liu, Guangbin Ji, Peng Zhang, Xingzhong Cao, Baoyi Wang, Chuhong Zhang, Xuguang Zhou, Yan Zhu, Daning Shi, Hydrogenated Oxygen-Deficient Blue Anatase as Anode for High-Performance Lithium Batteries, ACS Appl Mater Interfaces 2015 Oct 16;7(42):23431-8. Epub 2015 Oct 16;
- Chuhong Zhang, Stephen Gamble, David Ainsworth, Alexandra M. Z. Slawin, Yuri G. Andreev, Peter G. Bruce. "Alkali Metal Crystalline Polymer Electrolytes", Nature Materials, 8, 580, 2009.
- Chuhong Zhang, Yuri G. Andreev, Peter G. Bruce. "Crystalline Small-Molecule Electrolytes", Angewandte Chemie International Edition, 46, 2848, 2007.
- Chuhong Zhang, Valeria Arrighi, Simona Gagliardi, Iain J. McEwen, Jeerachada Tanchawanich, Mark T.F. Telling, J.-M. Zanotti. "Quasielastic Neutron Scattering Measurements of Fast Process and Methyl Group Dynamics in Glassy Poly(vinyl acetate)", Chemical Physics, 328, 53, 2006.

Research Profile

Name: **Dr Ben Whiteside**
Position: **Senior Lecturer**
Institute/division: **RKT Centre for Polymer Micro and Nano Technology**
Email: b.r.whiteside@bradford.ac.uk
Tel: +44(0)1274 236266 / 236967

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Surface structuring of polymers, property control via processing, and optical characterisation methods
聚合物的表面结构, 加工的属性控制及光学特性的方法。

Primary Research interests:

Ben currently leads the RKT Centre for Polymer Micro and Nano Technology based at the University of Bradford which provides a key resource for Industry working to bring micro and nano scale components to market, alongside internationally recognised pioneering academic research in the field.
Key areas are: Surface structuring of polymeric devices using feature replication, material-specific behaviour, crystallisation properties and post processes including plasma treatment or embossing.
Product property control using advanced process control and novel materials and material combinations to tailor internal morphology.
Optical characterisation methods for polymer processes including high speed optical and thermal imaging systems.

Current research areas include:

a. **Moulding of nano-precision optics** using a range of technologies
b. **Ultrasound micro-injection moulding**
c. **Characterisation of polymers and nano-composites/suspensions in high strain rate environments**
d. **High speed process measurement** using internet enabled technologies
e. **Novel sensor development.** Utilising a range of emerging technologies including piezoelectric ultrasonic sensors, IR sensors etc.
f. **Software development** to enable high speed data acquisition/archiving and process characterisation.
g. **Studies of the effect of processing parameters on the geometric, morphological and mechanical properties of micromoulded products**. Measurement techniques include AFM, nano indenting optical profilometry and nano-DMA, applications include anti-microbial surfaces.
h. **High speed optical and thermal imaging of micromoulding flows**
i. **Investigations of nano-composite properties** and nano-particulate dispersion in polymers.
j. **Development of novel machine vision techniques** for 100% product inspection in micromoulding processes. Techniques include Extended Depth of Field and white light interferometry.

Topics in which you would like to develop collaborative research:

Surface structuring of polymeric devices using feature replication, material-specific behaviour, crystallisation properties and post processes including plasma treatment or embossing.

Product property control using advanced process control and novel materials and material combinations to tailor internal morphology.

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

Co-Director of International Polymer Micro Processing Centre – a collaboration between State Key Laboratory of Polymer Materials Engineering, Sichuan University, China and Polymer IRC, University of Bradford, UK

Cotech, Polysense and Microman EU Consortia

Nanofactory – UK University collaboration

Bradford Industry Group

Relevant graphics, figures, pictures:

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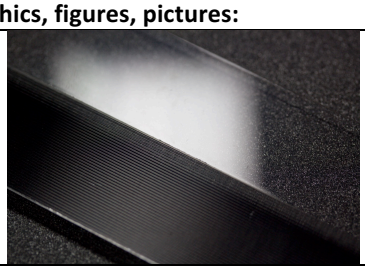
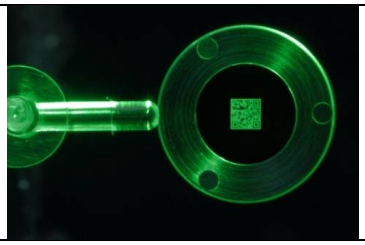
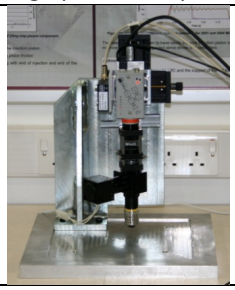
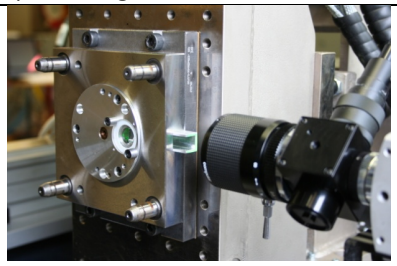
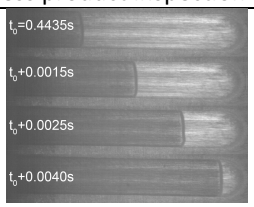
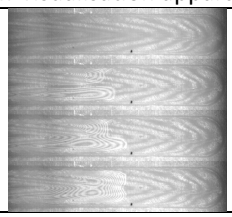
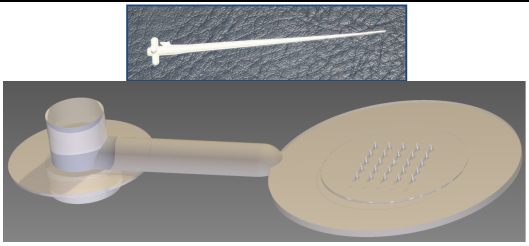
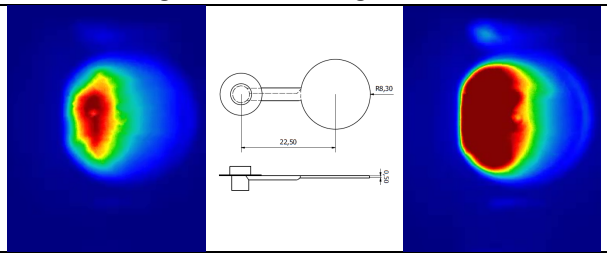
<tr><td>  </td><td>  </td></tr>
<tr><td>High precision optics</td><td>Nano-patterning anti counterfeit technologies</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>In process product inspection system</td><td>Flow visualisation apparatus</td></tr>
<tr><td> 
</td><td>  </td></tr>
<tr><td>High speed flow front tracking</td><td>Stress birefringence and shrinkage measurement</td></tr>
<tr><td>  </td><td> 
</td></tr>
<tr><td>Examples of precision moulding of medical products – dental root canal filling core, and microneedles</td><td>High speed thermal imaging of ultrasound injection process</td></tr>
</table>

Publications and other outputs relevant to your interest in this programme

1) G-X Fei, C Tuinea-Bobe, D-X Li, G Li, B Whiteside, P D Coates and H-S Xia, Electro-activated surface micropattern tuning for microinjection molded electrically conductive shape memory polyurethane composites RSC Advances 12/2013; 3(46):24132-24139. DOI: 10.1039/C3RA43640C 2013
2) Z-Y Jiang, Y-T Wang, L-L Fu, B Whiteside, J Wyborn, K Norris, Z-H Wu, P D Coates, and Y-F Men. Tensile Deformation of Oriented Poly(ε-caprolactone) and Its Miscible Blends with Poly(vinyl methyl ether) Macromolecules, Vol. 46, No. 17, pp. 6981−6990; DOI: 10.1021/ma401052x. 2013
3) G González Castro, BR Whiteside, R Spares, H Ugail, J Sweeney, Applied Mathematical Modelling, 36, 3, pp1161-1172, 2012
4) Kelly AL; Gough T; Whiteside BR; Coates PD, High shear strain rate rheometry of polymer melts **114** pp864-873 0021-1995 Journal of Applied Polymer Science, 2009
5) BR Whiteside, MT Martyn, PD Coates (2005). *In-process Monitoring of Micromoulding – Assessment of Process Variation.* International Polymer Processing, 2005/02, Page 162-169

Research Profile

Name: **Yongfeng Men**
Position: **Professor**
Institute/division: **State Key Lab Polym. Phys. Chem.**
Changchun Inst. Appl. Chem. (CIAC), Chinese Acad. Sci. (CAS)
Email: **men@ciac.ac.cn**
Tel: **+86 431 85262907**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Polymer Structure Physics including: Structure-properties relationships in semi-crystalline polymers and polymeric latex dispersions; Polymeric phase change materials

高分子结构物理，包括：结晶高分子及高分子乳液的结构与性能；高分子相变材料

Primary Research interests:
Linking macroscopic properties of polymeric materials with their micro-structural evolution by means of (synchrotron) small and wide angle X-ray scattering techniques.

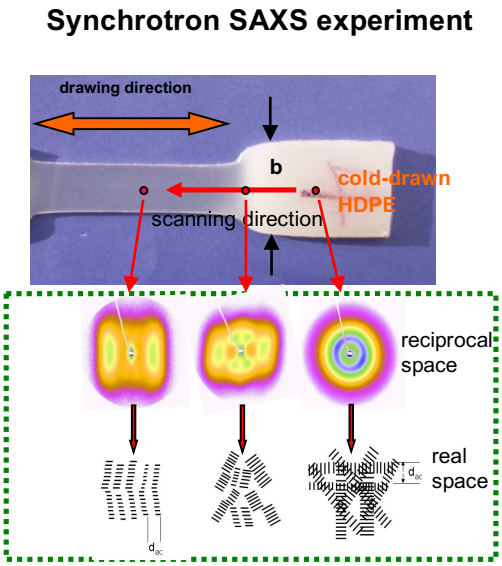
Topics in which you would like to develop collaborative research:

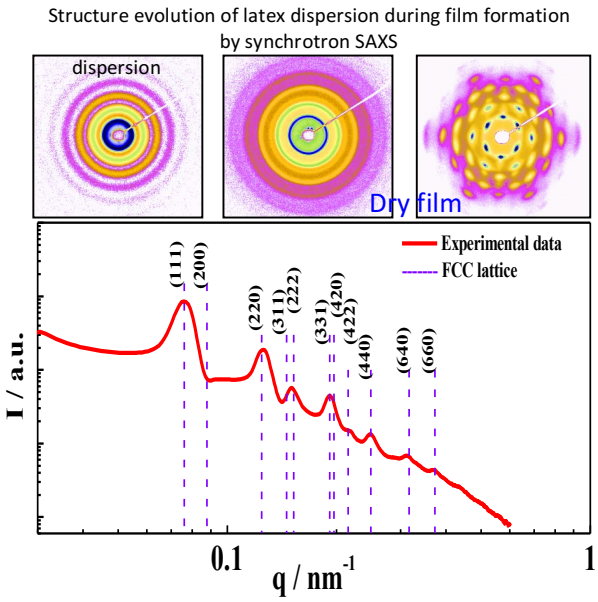
- crystallization of polymers and their deformation mechanism
- film formation of latex dispersions and functional coatings
- application of polymer phase change materials that store and release heat at designed temperatures

Relevant existing collaborations (academic/clinical/commercial) inside or outside China.

- Royal Society - Newton Advanced Fellowship (NA150222) "Advanced Processing Physics of Micro molding and Die Drawing of Polymers for Control of Properties" (collaborating with Prof. Phil Coates)
- film formation of latex dispersions with BASF SE, Germany
- structure and properties of polypropylene with Exxonmobil

Relevant graphics, figures, pictures:





Publications and other outputs relevant to your interest in this programme

1. Qiao YN; Wang Q; **Men YF** *Macromolecules* **2016**, *49*, 5126-5136.
2. Zhao JY; Sun YY; **Men YF** *Macromolecules* **2016**, *49*, 609-615.
3. Lu Y; Wang YT; Chen R; Zhao JY; Jiang ZY; **Men YF** *Macromolecules* **2015**, *48*, 5799-5806.
4. Wang YT; Lu Y; Zhao JY; Jiang ZY; **Men YF** *Macromolecules* **2014**, *47*, 8653-8662.
5. Wang YT; Lu Y; Jiang ZY; **Men YF** *Macromolecules* **2014**, *47*, 6401-6407.
6. Wang YT; Jiang ZY; Fu LL; Lu Y; **Men YF** *Macromolecules* **2013**, *46*, 7874-7879.
7. **Jiang ZY**; Wang YT; Fu LL; Whiteside; Wyborn J; Norris K; Wu ZH; **Coates P**; Men YF *Macromolecules* **2013**, *46*, 6981-6990.
8. Sun YY; Fu LL; Wu ZH; **Men YF** *Macromolecules* **2013**, *46*, 971-976.
9. Wang YT; Jiang ZY; Wu ZH; **Men YF** *Macromolecules* **2013**, *46*, 518-522.
10. Jiang ZY; Fu LL; Sun YY; Li XH; **Men YF** *Macromolecules* **2011,** *44*, 7062-7065.

University of Bradford

Inspired by our past to help shape your future

With almost 50 years of academic excellence behind us as a University, we have continued to grow our international reputation and course provision. We have always been pioneers in developing new course subjects, reflecting and anticipating the needs of employers, our students, and of society as a whole.

Bradford was the first university outside London to offer part-time degree courses, and our courses are designed in response to the changing business, social, scientific and environmental landscape.

From the first modern Business School, which has an international reputation, the first Peace Studies degree to the first Medical Engineering degree, we continue to offer relevant, practical and useful learning for all our students.

Today our associations with employers have expanded across the globe. Our collaborations range from associations with local employers through our employer engagement initiatives, to overseas partnerships including those in China, Singapore, Brunei, Malaysia, Pakistan and India. See www.bradford.ac.uk

Polymer Interdisciplinary Research Centre

The Polymer IRC laboratories at Bradford form part of the wider Polymer IRC (Universities of Leeds, Bradford, Durham and Sheffield). We are a world-leading research laboratory for process structuring of polymers, polymer composites/nanocomposites, biomaterials and pharmaceuticals, with novel and conventional materials processing, including: 40 advanced manufacturing lines for melt phase, solid phase and reactive processing, extensive physical and chemical characterisation over the length scales, and computer modelling. We have wide-ranging academic collaborations and currently work with over 150 companies. Please see the overview at www.polyeng.com , and the Polymer IRC pages in this booklet

MeDe – the EPSRC Centre for Innovative Manufacturing in Medical Devices

The UK's Centre for Innovative Manufacturing in Medical Devices researches and develops advanced design and manufacturing methods for the Class III, musculoskeletal medical device sector. Growth of the medical devices sector looks set to remain at 10% for the foreseeable future and there is growing demand for increased reliability and lifetime performance of medical devices. Our innovative design and manufacturing advances focusses in the first instance on class 3 medical devices for musculoskeletal disease, where the cost of device failure and need for throughout life reliability are high. Our research aims to answer these global demands, underpinning the development of musculoskeletal medical device manufacture to provide methods of producing cost-effective, reliable and effective devices; supporting the development of the sector and satisfying the health service's requirement for new, innovative and cost effective treatment options. These devices – and manufacturing processes – will ensure that the patients of the future are provided with devices that offer enhanced standards of reliability and performance.

The Centre is a collaborative research project which brings together expertise from the Universities of Leeds, Newcastle, Nottingham, Bradford and Sheffield as well as a range of expert clinicians from across the UK. Our 12 founding industry members are embedded within our research projects, with many more forming an industry-wide network. Our Centre for Innovative Manufacturing in Medical Devices is funded by the Engineering and Physical Sciences Research Council and is part of a wider programme of support for innovative manufacturing research centres. In 3 years, it has leveraged £67m support, from an original grant of £5.7m. See www.mede-innovation.ac.uk Please also see the MeDe pages in this booklet.

The Newton Fund

The Newton Fund (£735 million over a 7 year lifetime) aims, through science and innovation partnerships, to promote the economic development and welfare of poor people in developing countries. The Fund is overseen by the Department for Businesses Innovation and Skills (BIS) and is delivered through 15 delivery partners in collaboration with 15 partnering countries. For more information visit: www.newtonfund.ac.uk.

Chengdu and Sichuan University

Chengdu

Chengdu City, the capital of Sichuan Province and the hometown of the Giant Panda, is both the cultural and industrial centre of the Chengdu Plain of southwest China. The history of Chengdu spans more than 2000 years and the city abounds with historical and cultural relics and is famed also for its satins and brocades. Chengdu is one of the Top Tourist Cities in China, and it was awarded one of the Most Attractive Tourist Cities in China, 2006. At present, it has many places of interests, including World Heritages, National Key Cultural Relics Protection Units and State Key Cultural Relics Protection Units. Chengdu's regions are so unique and diverse; there are plenty of options to discover something new each time you visit. There is a major expansion plan already begun, approximately doubling the area of Chengdu through Tianfu New Area, including a second major airport, and science and innovation, industry and living regions, in an ecological development.

Sichuan University

Founded in 1896, Sichuan University is one of the three oldest universities in mainland China. It is one of the most prestigious national key universities in education, research, and social impact.

As one of the few most prestigious universities in China, Sichuan University commits itself to world-class teaching, learning, and research, serving as an innovation engine that propels China to a new stage of development.

Sichuan University faculties actively engage in the global knowledge network and push the limits of human knowledge in new energy, human health, material science, arts, etc. The full-spectrum of disciplines within Sichuan University is comparatively advantageous to encourage researchers of different areas to collaborate for addressing complex challenges.

Sichuan University has engaged itself in varied global academic communities by establishing cooperative relationships with over 150 world renowned universities and research institutes in 42 countries and regions. We have established all-dimensional, multi-layer, and varied types of staff and students exchanges programmes with 33 leading research universities from over 10 countries. Sichuan University expects to join hands with more universities in academic and research collaborations. For more information visit: http://www.scu.edu.cn/en/

State Key Laboratory for Polymer Materials Engineering

Sichuan University had the first discipline of polymer materials in China, founded in 1953. It now represents the largest polymer research base in China (~220 staff, ~ 2200 students). The State Key Laboratory of Polymer Materials Engineering (SKLPME) was established at Sichuan University in 1991, under the direction of Prof Xu Xi. The Polymer Materials and Engineering International Joint Research Center was approved by MoST in 2014.

www.polymerirc.org

The Polymer IRC progresses!

We are delighted that *six* major steps have occurred since mid-2015. These are

1. Materials Chemistry adding to the strength of the Polymer IRC in Bradford, summer 2015;
2. A joint Laboratory for Polymer Process Physics was announced in September 2015 between Changchun Institute of Applied Chemistry CAS and the Polymer IRC at the University of Bradford;
3. Xplore have placed a PM5 specialist compounding and film processing line in our laboratories, particularly for pharmaceuticals processing
4. A significant donation of biomedical polymer technology was donated to our laboratory in Bradford by Smith & Nephew Ltd
5. A joint International Laboratory for Soft Matter Technologies between Beijing University of Chemical Technology and the Polymer IRC at the University of Bradford, will be announced at the Chengdu Workshop, December 2016.

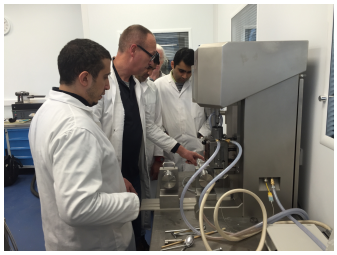
In the summer of 2015, **Materials Chemistry**, led by **Professor Stephen Rimmer**, became a fourth Research Centre constituting the Polymer Interdisciplinary Research Centre at Bradford. Prof Rimmer joined the University of Bradford, as the new Head of Chemistry, in the Faculty of Life Sciences, from Sheffield University in May 2015 and is a long-standing collaborator, having been involved in all of our Science Bridges China/ UK-China AMRI Research Workshops. He is a Board member of the UK China AMRI. Aspects of Steve's work and that of his team can be found at http://www.brad.ac.uk/life-sciences/chemistry-and-forensic-sciences/research/
Research in Chemistry includes

- Nanoscience,
- Medicinal Chemistry (our **Institute of Cancer Therapeutics**, is heavily involved in the Science Bridges China/ AMRI platforms)
- Polymer Science,
- Functional Materials,
- Crystal Engineering and
- Analytical Chemistry.

In brief, the Polymer Science activity is focused on the synthesis and properties of functional polymers: We have good collaborative relationships with large sections of the polymers and biomedical devices industry. Functional polymers are produced using a variety of methods including radical, cationic and ring-opening polymerisations as well as step-growth techniques such as polyurethane synthesis. We also make extensive use of polymerisations in disperse media; such as emulsion polymerisations. Recently, one of our focuses has been on producing functional hydrogels to support cells for applications in tissue engineering. Here our aim is to control cells as they develop and grow and to examine how the structure of the materials affects performance and cell compatibility. Another strong theme is to use functional polymers to detect pathogens in infective diseases and here we are developing unique medical devices for use at the point of care.

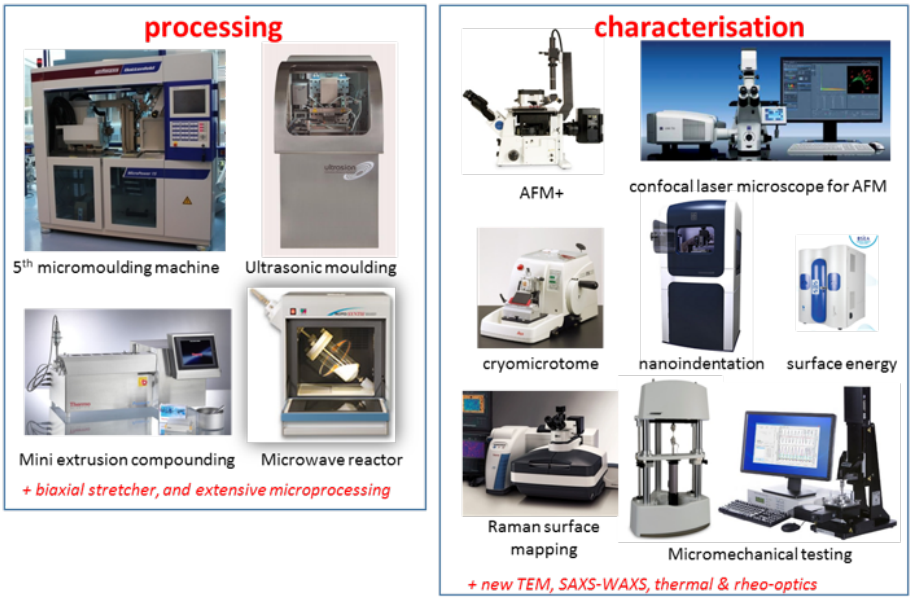
The **Joint International Research Laboratories** with Sichuan SKLPME, for Polymer Micro Processing, and with Changchun CIACCAS for Polymer Process Physics with Changchun are promoting our research collaborations and joint publications of leading research. They continue to provide a platform for collaborative ventures and joint funding. These will be joined by the new Joint

International Laboratory for Soft Matter Technologies, with BUCT – directed by Prof Liqun Zhang and Prof Phil Coates. We already have research exchanges, and excellent joint publications with Prof Zhang's team and Prof Coates is an Honorary Professor of BUCT. We look forward to joint programmes!



Our world class **Facilities** have been further enhanced by the equipment from Xplore (a PM5 stainless steel conical twin screw extruder and film line – shown right) aimed primarily at pharmaceuticals processing, and by extensive biomedical materials extrusion and drawing facilities from Smith & Nephew Ltd.

These add to the EPSRC Capital award which has seen extensive processing and characterisation facilities installed in our laboratory:



The latest of these are the FEI (now Thermo Fisher) TEM and the Anton Paar SAXSpace x-ray diffraction facilities:

A schematic of the Polymer IRC structure at Bradford is shown overleaf, followed by a 'timeline' of the development of the Polymer IRC. Professor Phil Coates FREng is the overall Director of the Polymer IRC, based at Bradford in the Faculty of Engineering & Informatics, and Director of the Advanced Materials Engineering RKT Centre. Dr Ben Whiteside is Director of the Polymer Micro & Nano Technology RKT Centre, and Professor Anant Paradkar is Director of the Pharmaceutical Engineering Sciences RKT Centre (hosted in the Faculty of Life Sciences).

Polymer IRC at Bradford (EPSRC; 1989 -)

www.polyeng.com

polymer IRC

Bradford
Leeds
Durham
Sheffield

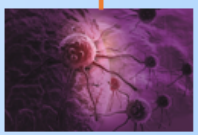
www.polymerirc.org

RKT Centres:

Materials Chemistry

http://www.bradford.ac.uk/life-sciences/chemistry-and-forensic-sciences/research/

Polymer Science, Nanoscience
Medicinal materials
Functional materials
Crystal Engineering



Pharmaceutical Engineering Science

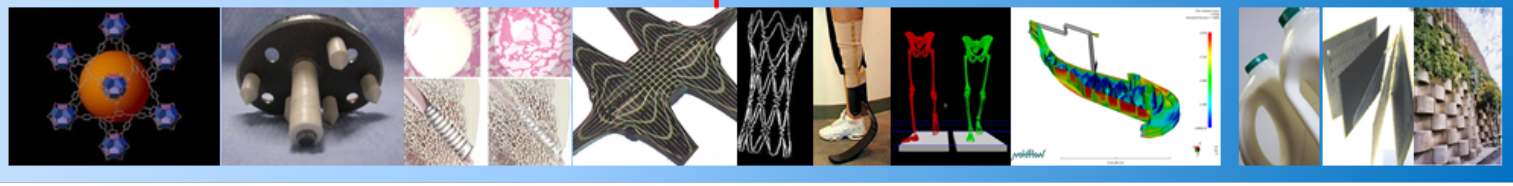
www.pharmaceutical-engineering.brad.ac.uk/
School of Life Sciences

Pharmaceutical structuring for enhanced bioavailability/ drug delivery

Advanced Materials Engineering

www.brad.ac.uk/research/rkt-centres/advanced-materials-engineering/

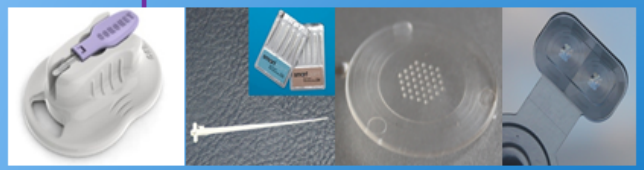
*Advanced materials for **Healthcare Technology** & **Resource Efficiency**; including solid phase & fibre orientation processing*



Polymer Micro & Nano Technology

www.polymer-mnt.brad.ac.uk/; www.ukmig.com

Micromoulding & surface structuring for Healthcare & Telecommunications



Polymer Centre of Industrial Collaboration

Industry facing aspect of our research labs

Bradford Industry Group

Industry technical/ consultation group
(>100 companies)
www.polyeng.com/polymercic

Faculty of Life Sciences

Faculty of Engineering & Informatics

UK:
QUB, Warwick, York, Oxford, Cambridge, Huddersfield, Swansea, Nottingham, Loughborough; +

MeDe Innovation
EPSRC Centre for Innovative Manufacturing in Medical Devices

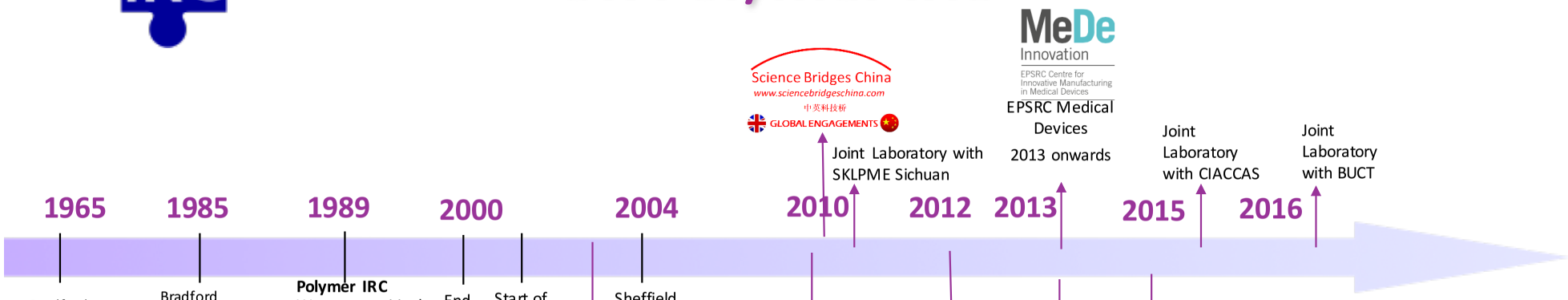
International:
(inc. RCUK Science Bridges China, EPSRC Global, and Joint international laboratory with Sichuan University)

中英科技桥 Science Bridges China
www.sciencebridgeschina.com

UK-CHINA amri
Advanced Materials Research Institute

INDUSTRY:
>100 companies collaborating/ projects, joint IP

UK Polymer IRC



www.polymerirc.org www.polyeng.com

About MeDe:

Advancing orthopaedic medical device manufacturing

The Centre for Innovative Manufacturing in Medical Devices researches and develops advanced design and manufacturing methods for the Class III, musculoskeletal medical device sector.

The medical devices sector is growing at 10% per annum and there is increasing demand for enhanced reliability and lifetime performance of medical devices. Our innovative design and manufacturing advances will focus in the first instance on Class III medical devices for musculoskeletal disease, where the cost of device failure and need for throughout life reliability are high.

Our research will answer these global demands, underpinning the development of musculoskeletal medical device manufacture to provide methods of producing cost-effective, reliable and effective devices; supporting the development of the sector and satisfying the health service's requirement for new, innovative and cost effective treatment options.

These devices – and manufacturing processes – will ensure that the patients of the future are provided with devices that offer enhanced standards of reliability and performance.The Centre is a collaborative research project which brings together expertise from the universities of Leeds, Newcastle, Nottingham, Bradford and Sheffield as well as a range of expert clinicians from across the UK. Our 12 founding industry members are embedded within our research projects, with many more forming an industry-wide network.

Our Centre for Innovative Manufacturing in Medical Devices is funded by the Engineering and Physical Sciences Research Council and is part of a wider programme of support for innovative manufacturing research centres.

- See more at: http://mede-innovation.ac.uk/

Right product, right process, right patient, right time

Our research focusses on addressing two key challenges: **functionally stratified design and manufacture of devices,** to produce more robust design, manufacture and deployment processes to accommodate variations in patients, populations and surgical techniques. The second challenge, **manufacturing at the point of need**, will develop new manufacturing techniques to allow devices to be produced in the clinical setting, customised to an individual patient.

We have already made significant achievements in just two years – working with Simulation Solutions Ltd to develop new hip and knee simulators and pre-clinical testing methods that are now being sold across the UK and Asia; our new simulation methods being adopted by global orthopaedics companies; and our fundamental research into 3D

printing methods for new materials is advancing to potentially develop novel near-patient manufacturing methods.

World-class collaborations at the heart of UK medical device innovation

The Centre is a collaborative research project which brings together expertise from the universities of Leeds, Newcastle, Nottingham, Bradford and Sheffield as well as a range of expert clinicians from across the UK. Our 14 founding industry and clinical members are embedded within our research projects, with many more forming an industry-wide network.

Dissemination of research and moving it along to adoption is central to our mission and we value input from those working across the medical device sector in the UK.

The network aims to not only inform, but also to connect, enabling businesses, policy makers, academics and clinicians to share information, knowledge and ideas and debate the challenges and issues facing the community.

Membership is free and it's easy to join: http://mede-innovation.ac.uk/

Our **Annual Report for 2016** can be found at http://mede-innovation.ac.uk/wp-content/uploads/2013/08/MEDE_Innovation_Annual-Report_WEB.compressed.pdf

The Context of MeDe:

The Centre for Innovative Manufacturing in Medical Devices is part of a wider initiative funded by the Engineering and Physical Sciences Research Council (EPSRC) aimed at maximising the impact of innovative research for the UK.

Each Centre has been set up to respond to a specific business need and will support existing industries as well as, importantly, opening up new industries and markets in growth areas. Every Centre has been awarded five years funding to retain staff, develop collaborations and support major research projects. The funded support from the EPSRC will be used as a platform from which the Centres can secure further investment from industry and other funders.

As well as working extensively with academic, clinical and industry partners, the Centre for Innovative Manufacturing in Medical Devices will maintain a close contact with other Centres for Innovative Manufacturing. These relationships, and those we have already formed with initiatives aimed at research exploitation, will provide further opportunities for our research.

Innovation Research

Our Centre focuses on two flagship research themes, split into smaller projects which address some of the key challenges facing medical device manufacturers and healthcare providers.

Theme 1: Stratified design & manufacture

Across all markets there is a demand for increased reliability and assurance of throughout lifetime performance of medical devices. Enhanced pre-clinical simulation and fuller evaluations of medical devices are necessary to meet the requirements of new developments in the regulatory framework for medical devices. These new developments include increasing stringency in regulation and the global harmonisation for regulatory approval, both of which increase the cost of compliance for manufacturing companies.

In the developed world and tier one markets, patients are demanding earlier intervention and tissue preservation, which requires enhanced diagnostics and increased levels of personalisation. New approaches to design and manufacturing and new materials technologies are needed to deliver this within the existing cost envelope; supported by less invasive surgery and shorter hospital stays.

Our research, which is split into four distinct projects, will address increased functional stratification to produce more robust design, manufacture and deployment processes to accommodate variations in patients, populations and surgery.

Project 1A: Functionally stratified design & manufacture of hip & knee implants

Project 1B: Stratified bioprocesses for the manufacture of acellular scaffolds

Project 1C: Stratified design & manufacture of nonwoven collagen scaffolds

Project 1D: Manufacture of fully bioresorbable multiphase fixation devices to order

Theme 2: Manufacturing at the point of need

Manufacturing at the point of need is central to developing processes which are (where possible) minimally invasive and that can effectively deliver bioactive materials. One of the major drivers for novel surgical interventions is to decrease the anatomical injury at surgery, reduce patient time in patients and accelerate the rate of recovery .

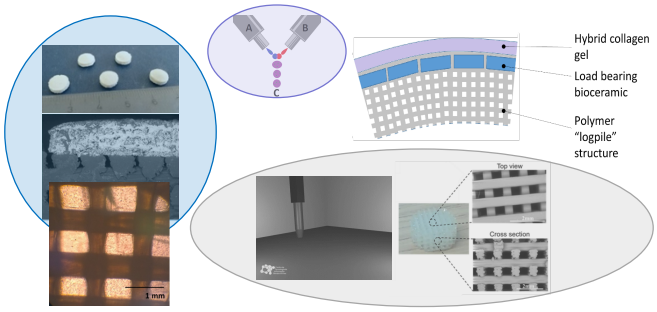
The last decade has seen significant growth in research into biofabrication and many approaches have been developed. However many of these suffer from limitations, in particular in relation to structural materials being too soft to provide significant support in clinical applications.

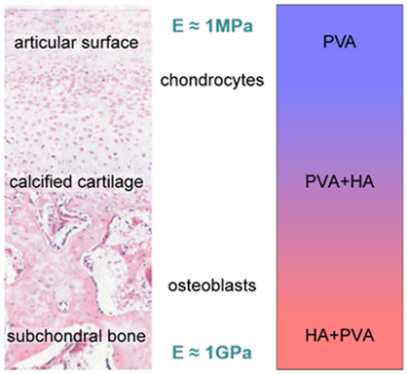
This research theme will address defects in the musculoskeletal system as early as possible, through the development of more robust structural bioactive materials, such as

bioactive glass-ceramics and biopolymers. It will also examine the potential for enhancement of devices using biomolecules and the optimisation of devices to enable them to interact with cells added at the site of implantation or those that have been therapeutically added.

Project 2A: Minimally invasive implantation of bioactive materials

Project 2B: Processes for in-clinic manufacture





Biomimetic, functional gradient PVA-hydroxyapatite and tricalcium phosphate composites

Feasibility studies

MeDe Innovation is widening the national reach of its research by awarding feasibility study funding to shape the future direction of the Centre.

Eight of the UKs leading scientists, engineers and clinicians have been granted awards of £50k to identify the key challenges and questions that are not currently being addressed in orthopaedic medical device design and manufacture research.

The funds will allow investigators to develop the evidence and refine the research questions that will allow the development of full proposals for funding that can be submitted to existing national and global funding schemes.

A panel of leaders from industry and academia selected the winners from nominations put forward by over 20 universities and companies. The winners showed an exemplary fit with the research challenges being led by the Centre, offered significant potential and had support from industry:

3D printing of Lumbar Fusion Cage based POSS-Nanocomposite Biomaterial - Prof Alexander M. Seifalian & Dr Deepak M. Kalaskar, UCL Centre for Nanotechnology & Regenerative Medicine, Division of Surgery and Interventional Science, University College London.

Advanced Manufacture of Thermo-Sensitive Medical Devices for Targeted Regeneration of Endochondral Bone at the Bone-Tissue interface -Dr Nicholas Dunne & Dr Helen McCarthy, Queen's University Belfast

Preliminary Study of Expandable Osteochondral Scaffolds in Achieving Mechanical Stability and Biological Fixation for Large Osteochondral Defect Repairs -Dr Chaozong

Liu, Prof Gordon Blunn, Mr Andrew Goldberg, Institute of Orthopaedic & Musculoskeletal Science, University College London

Round two had two projects, both successfully completed:

At Brunel University, Dr Yan Huang led research into new biomedical magnesium alloy matrix hydroxyapatite reinforced nanocomposites with controlled degradation. These alloys could allow magnesium to fulfil its potential in medical device design and application.

Dr Hengan Ou, at the University of Nottingham, developed manufacturing techniques for producing cranial plates using a polymer material called PEEK. The team aimed to demonstrate the feasibility of using an incremental sheet forming technique to manufacture the plates and is now investigating larger collaborative projects based on this research.

Fresh Ideas funding is the most recent stream of funding, bringing in collaborators in the UK.

A joint project at the Universities of Bradford and Cardiff aims to create a surface for silicon-based prosthetic devices with self-cleaning properties similar to butterly wings. Led by Dr Maria Katsikogianni and Professor David Williams, the researchers are combining physical and chemical engineering techniques to modify the surface of an implant to make it resistant to microbial adhesion. A second project, based at Bradford, is investigating using micro-injection moulding techniques to produce implants using PEEK that have anti-microbial surface properties. Led by Dr Maria Katsikogianni and Dr Ben Whiteside, the team has produced a structured surface that prevents bacterial adhesion and bio film formation.

The Universities of Leeds, Newcastle, and UCL combine to develop an advanced medical device prototype for rotator cuff tear repair, mimicking structure, function and mechanical properties of rotator cuff tissue components. The team designed and manufactured a fibrous tendon tissue-like ‘graft’ to be joined to a porous titanium bone ‘anchor’ in filtrated with a protease- inhibiting, cell-homing collagen hydrogel. A proof of concept study will now be carried out, and next steps will focus on the biomechanical and biochemical evaluation of the device, as well as customisation of resulting prototypes.

RCUK Bradford Science Bridges China

UK-China Advanced Materials Research Institute

中英先进材料研究所

An initial Board Meeting was held on 19 April 2012, 5pm-6pm, Shangri-la Hotel, Chengdu, constituted of leaders from the six founding research groups in Sichuan, BUCT, ICCAS, CIACCAS.

Purpose: The leading researchers involved in UK-China collaborations in polymer-related materials, brought together by the RCUK Bradford Science Bridges China programme, agree to form the UK-China Advanced Materials Research Institute. This virtual institute will represent the growing UK-China research collaborations in a more coherent and substantial way, linking members together more visibly, for increased impact.

This will be valuable to all members, as it will:

- show a critical mass of leading Chinese and UK researchers who wish to collaborate in areas of research which are identified by our countries as strategic, and who show that they have a successful track record of collaboration, and
- help to increase our research co-operations and friendship, and create new opportunities for exchanges and funding.
- strengthen our joint approaches to UK and Chinese funding agencies,

Initial Scientific Focus:

The Research Institute will aim to bring together leading UK and Chinese research groups with Advanced Materials research strengths, especially Polymer-related materials and processing. An initial focus will be on 'advanced materials for healthcare'. This is an area identified by both the UK and China as a priority for research cooperation. This area also includes a range of materials interests, built strongly on our polymers and polymer-related materials expertise, and includes drug delivery and biomaterials aspects. Our approach is genuinely interdisciplinary, across materials science, engineering, physics, chemistry and biomaterials disciplines. Many materials advances offer potential application to healthcare, an initial focus, but the Institute will cover other advanced materials 'themes' which are also strategically important, such as advanced materials for Energy/ Resource Efficiency, and more general materials areas such as polymer nanocomposites.

Research Institute proposed activities:

- **Communications –** by regular emails, by conference calls, web site and organised meetings.
- **Annual meeting**: this would involve (i) a **technical meeting**, reporting progress of collaborative research and aiming to discuss funding opportunities, develop new research and staff exchange opportunities, and (ii) a **business/strategy discussion** for the Institute and its research directions. Depending on funding streams, co-hosting, etc, it should be feasible to call an annual 2-day meeting in China or the UK. (Bradford currently has support for this for the next year).
- **Researcher exchanges** are encouraged, to develop research capacity and research training; similarly joint supervision of Research Students is encouraged.
- **Joint international laboratories**: Although the proposal is for a 'virtual' Research Institute, we aim to have joint international laboratories established or developed. Bradford and Sichuan University currently have such a joint laboratory for Polymer Micro Processing. An alternative is to identify clusters of research groups with at least one Chinese member and one UK member, with similar research interests.

- **Joint research projects and funding bids** (in China to MOST and NSFC, in the UK to EPSRC, and potentially in Joint Calls); industrially supported projects are welcome.

Research Declaration

Here is a draft **'Research Declaration'** to describe ourselves as members of the new Research Institute.

UK-China Advanced Materials Research Institute – Research Declaration:

We, the members of the UK-China Advanced Materials Research Institute, agree the following:

- **Research Quality:** We are committed to excellent basic research, and recognise the importance of knowledge generation and intellectual advancement,
- **Research applied:** We recognise the importance of the application of our knowledge, to benefit all.
- **Research vital for innovation:** We believe that research is vital for innovation, that there is a pipeline from research to innovation and eventual commercial exploitation.
- **Academic Research Collaboration:** We value highly collaboration in our research and innovation. We recognise that such collaboration needs to be of mutual benefit, for example with joint publication and joint intellectual property, and it is highly preferred that collaborations should be long term to build up the advantages and develop teams of researchers.
- **Collaboration with industry:** We also recognise the high value of collaboration with industry in our research programmes, to help direct aspects of our research and knowledge transfer more effectively.
- **Social value:** We are responsible researchers, with a commitment and passion for our countries and our subject areas. We pursue excellence, and seek to benefit our academic community and our collaborators. Our funded programmes should be good value for money, and have clear targets.
- **International 'people bridges':** We are committed to international collaboration and to each other personally as we build 'people bridges', and help to combine our skills in research, knowledge transfer and innovation.

Web site: We have a web site (www.ukchina-amri.com) for access to useful documents including an alphabetical list of individual researcher profiles, laboratory profiles, non-confidential project information, journal publication information, publicity, etc.

UK-China AMRI Core members

UK Core members:

UNIVERSITY OF BRADFORD
MAKING KNOWLEDGE WORK™

polymer IRC
Universities of Leeds, Bradford, Durham and Sheffield

Chinese Core members:

Sichuan University: SKLPME, NERCB, Huaxi

Beijing University of Chemical Technology

CIAC
Changchun Institute of Applied Chemistry Chinese Academy of Sciences

ICCAS
Institute of Chemistry, Chinese Academy of Sciences

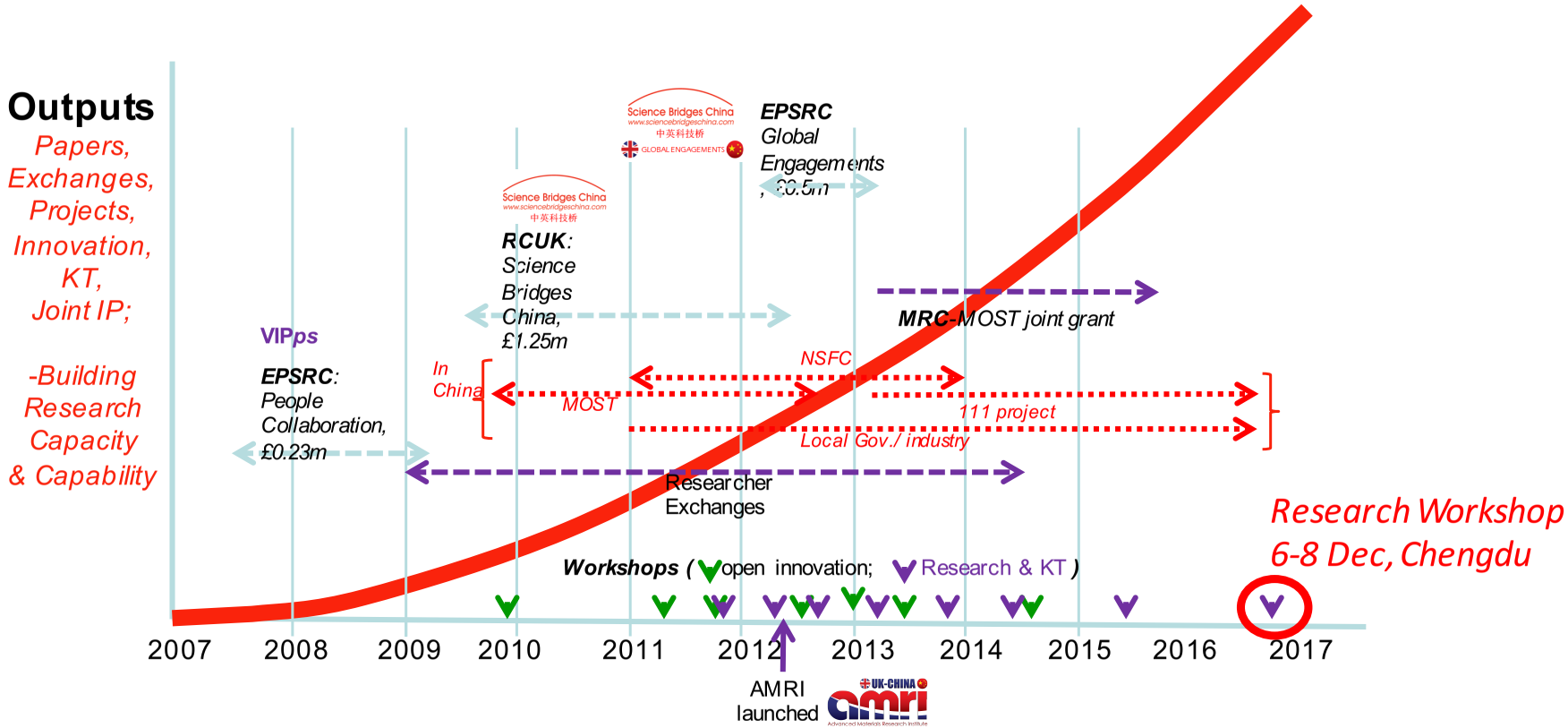
SIMM
Shanghai Institute Materia Medica Chinese Academy of Sciences

UK-CHINA amri
Advanced Materials Research Institute

Our Advanced Materials Research Workshops to date:

1. Beijing, 14-15 November 2011 co-hosted by BUCT and Bradford
2. Chengdu, 19-21 April 2012 co-hosted by Sichuan and Bradford
3. Bradford, 18-20 September 2012
4. Chengdu, 25-26 March 2013 co-hosted by Sichuan and Bradford
5. Bradford, 26-28 November 2013
6. Beijing, 5-6 May 2014 co-hosted by ICCAS, BUCT and Bradford
7. Bradford, 8-10 September 2015, co-hosted by UKIERI
8. *Chengdu, 6-8 December 2016, Newton Researcher Links/ Sichuan-Bradford*

Delivery: Growing the *community* platform



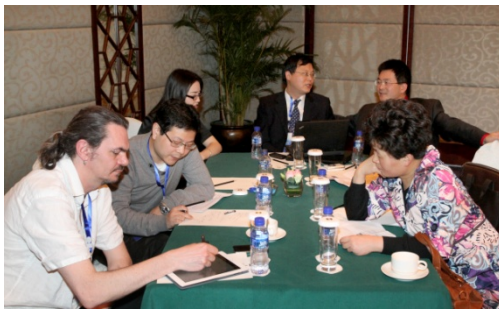
In China : Sinopec, DePuy/J&J, Paragon, Molex, AZ+…. In UK: Smith & Nephew, Autodesk, Sabic, +…
+ **Clinicians** from Beijing, Sichuan, Bradford,








Polymer IRC
University of Bradford, UK



Our UK-China Collaboration Successes

Ongoing collaborations include these externally funded programmes awarded to our teams in the past few years:

State Foreign Experts Bureau Ministry of Education

- ‘Introducing Talents from leading institutions or groups to Chinese Universities’ (**111 Programme** of Introducing Talents), Sichuan University programme announced September 2012– see below;

RESEARCH COUNCILS UK

- the **RCUK –MOST Joint Call** of April 2012, project announced December 2012: Biomaterials for Joint Soft Tissue Repair - Improving Health in Older Age; - Bradford, Sheffield, Durham, Sichuan, ICCAS;

China Scholarship Council
www.csc.edu.cn

- **Chinese Scholarship Council** one year awards (Profs Yinghong Chen (2011), Qi Yang (2011), Dongxu Li (2012), Dr Li Li (2013), Rui Han (2013), all from Sichuan University)

ROYAL ACADEMY OF ENGINEERING

- **Royal Academy of Engineering** UK-China research exchange scheme (Dr Zhiyong Jiang of Changchun CIACAS, March 2014, 10 months)

EPSRC
Engineering and Physical Sciences Research Council

- the EPSRC **Centre for Innovative Manufacturing in Medical Devices** (MeDe Innovation), £5.7m national centre; commenced October 2013 which will bring opportunities for international co-operation – see below;
- EPSRC **Capital for Great Technologies** award (£6.5m) for Advanced Materials in Healthcare for facilities providing opportunities for international co-operation – see below;

- The **Sichuan-Bradford Joint Research Laboratory** for Polymer Microprocessing was recognized by MOST in 2014

THE ROYAL SOCIETY Newton Fund

- **Royal Society Newton Advanced Fellowship Award:** *Advanced processing physics of micro molding and die drawing of polymers for control of properties;*
  Prof Yongfeng Men, Changchun CIAC Chinese Academy of Sciences &
  Prof Phil Coates FREng, Polymer IRC, Bradford (see below)
- Our **Researcher Exchange programme** is proving to be a major vehicle for enhancing research capacity and capability (see later in this booklet)

Programme of Introducing Talents from leading institutions or groups to Chinese Universities (111 Programme of Introducing Talents)

1,000 leading scholars from top 100 Institutions in the world : To help to build 100 leading research bases in Chinese universities; announced 12 September 2012:

State Foreign Experts Bureau Ministry of Education

International Team:

Leader Prof. P.D. Coates, Bradford University
Prof. A. Bismarck, Imperial College London
Prof. BS. Hsiao, Stonybrook Univ
Prof. L. Ambrosio, CNR-IMCB, Italy
Prof. DA. Schiraldi, Case Western Reserve Univ
Prof. P. Ducheyne, Univ of Pennsylvania
Prof. S. Rimmer, Sheffield Univ
Prof H.J. Sue,
Dr. M. Lavorgna,
Dr B. Whiteside, Dr P. Caton-Rose, Dr P. Twigg University of Bradford
Dr J.J. Wu, Durham University

Sichuan University team:

Leader – Prof Guangxian Li

Prof Qi Wang	Prof Q Fu	Prof Y Z Wang	Prof LY Chu
Prof Z M Li	Prof C H Zhang	Prof S Y Guo	Prof. C.S. Zhao,
Prof H.S. Xia,	Prof Q. Yang,	Prof J. Zhang,	Prof Y.H. Chen

Budget: Total: 9 million RMB in 5 years (renewable);
National expenditure: 450 million RMB
supporting fund from SCU: 450 million RMB

Research co-operation areas:

1. New theories and technologies in polymer processing (Overseas: Prof. P. D. Coates, Prof. B.S. Hsiao, Dr. M. Lavorgna, Dr. B. Whiteside, Dr. F. Caton-Rose, Dr. J.J. Wu SCU: Prof. G.X. Li, Prof. Q. Fu, Prof. Z.M. Li, Prof. S.Y. Guo, Prof. Q. Yang, Prof. J. Zhang)

- *Evolution and controlling of multi-level-structures in polymeric materials during processing*
- *New theory and technology for micro-processing*

2. High performance and functional polymeric materials (Overseas: Prof. A. Bismarck, Prof. L. Ambrosio, Prof. D. Schiraldi, Prof. P. Ducheyne, Prof. S. Rimmer, Dr. P. Twigg; SCU: Prof. Q. Wang, Prof. Y.Z. Wang, Prof. L.Y. Chu, Prof. C.H. Zhang, Prof. H.S. Xia, Prof. Y.H. Chen

- *High-performance materials based on common polymers'*
- *Environment friendly polymer materials*
- *Environment friendly polymer materials*

Some of our events:

Seven of the Sichuan team attended the PPE'13/ UK-China AMRI meeting in Bradford, November 2013:

Prof Guangxian Li and Prof Phil Coates participated in the visit by UK Science Minister, David Willetts to Sichuan University in December 2013 – see report below.

Prof Guangxian Li addresses UK Science Minister David Willetts and his group, including the Vice Chancellors of Liverpool, Manchester, Nottingham and the Open University, plus government officials, December 2013

December 2013 UK Government visit to China

– Science Bridges China/ UK-China AMRI feature strongly.

UK Science Minister, David Willetts had a meeting on Innovation in Shanghai on 3 December 2013. Prof Jiwen Zhang of SIMM CAS was a member of the discussion panel at this event.

On 4 December the UK Science Minister visited Sichuan University, hosted by Prof Guangxian Li. Prof Li and Prof Phil Coates gave a joint presentation on the strong cooperation between Bradford and Sichuan, emphasising the value of the Science Bridges China platform, and UK-China AMRI.

On both occasions, the Minister was accompanied by a group of UK Vice Chancellors and government officials

Successful project (*the only one funded from 37 applications*), announced December 2012:

Biomaterials for Joint Soft Tissue Repair - Improving Health in Older Age:

Led by **Dr Pete Twigg** (University of Bradford) and **Dr Chuhong Zhang** (Sichuan University).
University of Bradford *Dr Pete Twigg, Prof Phil Coates, Dr Colin Grant, Dr Fin Caton-Rose, Dr Leigh Mulvaney-Johnson, Dr Ben Whiteside;*

State Key Laboratory of Polymer Materials Engineering, Sichuan University *Dr Chuhon Zhang, Prof Qi Wang, Li Li, Ning Chen, Xi Wang, Xiao Chen, Yujun Yang, Jun Zhu, Huan Wang, Jia Wan;*

Institute of Chemistry, Chinese Academy of Sciences / *Profs Dong Qiu, Dujin Wang, Yunlan Su*

Sheffield University *Dr Aileen Crawford*

Durham University *Dr Junjie Wu*

Start date: April 2013 China/ June 2013 UK

Budget: £200k from Medical Research Council, UK, and 2M RMB from MOST, China.

Osteoarthritis is a currently incurable condition and a leading cause of functional disability and loss of independence in older adults globally, causing significant economic impact (1-2% GDP). This project proposes a novel cell-conducting osteochondral implant for the treatment of osteoarthritis and traumatic lesions of articular cartilage, which have a similar prevalence in Chinese and Caucasian populations. The implant is a polyvinyl alcohol-based hydrogel nanocomposite, which exhibits compositional/structural regions that mimic the appropriate biomechanical properties of the different regions of native tissue (i.e. subchondral bone, mineralised cartilage and cartilage) and support regeneration of cartilage tissue in situ. This implant should extend the pain-free function of osteoarthritic joints, thereby enhancing patient quality of life and mobility while reducing patient demands on health and social support services. In addition, the need for total joint replacement, with its potential problems of prosthesis loosening and limited lifespan, would be delayed.

This collaboration brings together the requisite multidisciplinary and complementary strands of research, and essential scientific expertise, from the partner institutions into a world class team to conduct the project. The proposal builds on links made through the existing RCUK Science Bridges China programme and will receive additional support through the RCUK Global Exchanges programme.

UK team: Our research focus is to fabricate a cell-conducting osteochondral implant scaffold; the material is a polyvinyl alcohol-based hydrogel nanocomposite. Initially the thrust of the research was to optimise the use of established experimental freeze-thaw techniques utilising Poly(vinyl alcohol) (PVA) and β-Tricalcium (β-TCP). The objective is to produce a modified protocol to facilitate a robust testing of the dynamic, mechanical and biocompatibility of the scaffold material. Process variables have included a range of weight % (15-30) and low to high molecular weight (89-98 & 146-186) of the PVA.

Varying the composition of the hydrogel and also the cross-linking is attributable to a change in the functionality of a polymer that can alter the results obtained from Dynamic Mechanical Analysis (DMA). The hydrogel is a viscoelastic substance; to investigate the viscous and elastic characteristics when undergoing deformation both storage modulus (E') *elasticity* and loss modulus (E'') *viscosity* are to be investigated from the Macro (dynamic compression & torsion), Micro (nanoindentation) and nano (AFM) DMA perspective.

A Bose Electro Force 3200 was the apparatus utilised to produce DMA data from the hydrogel. The sinusoidal stress was pre-set to represents a physiological frequency range 0.1-10Hz (walking mode = 1Hz). The recent delivery of a Biomomentum Mach-1 will facilitate additional torsion tests of the hydrogel. The significance of this new apparatus will be to apply a torsional stress that should allow the study of the intrinsic material properties with reduced fluid exudation from the material. This new data will be compared to the previous compression testing.

Future work includes the fabrication of a *functionally graded material* with a modulus range of approximately 1000X between the extremes of the material. This is necessary to mimic the properties of both cartilage and subchondral bone.

Sichuan are researching material combinations, including g PVA / Bioceramics Composites Prepared by Solid state shear milling (S3M) & Thermal Processing; PVA / Gel / Bioceramics Composites Prepared by S3M & Thermal Processing and Thermal Foaming of PVA / Bioceramics Composites. By combining our two developed technologies, thermal processing of PVA and S3M, PVA/bioactive particle composites have been successfully prepared, particle content can reach to 40wt%. The in-situ degradation of collagen fibers to gelatin during thermal processing has been achieved, greatly improving the thermal processability of PVA/bioactive particle composites; Using water as physical blowing agent and bioactive particles as nucleating agent, PVA foams with uniform porous structure have been prepared. These materials have potential applications in the biomedical field, e.g. soft tissue repair.

ICCAS are researching bioactive nanoparticles with well controlled structure, particularly exploring gradient biomaterials for cartilage repair with bioactive glass particles, and polymer-particle interactions.

Joint Research Laboratories:

Joint International Laboratory for Polymer Micro Processing, with SKLPME, Sichuan University – 2010:

Joint International Laboratory for Polymer Process Physics, with Changchun Insititute of Applied Chemistry, CAS – September 2015:

Royal Society Newton Advanced Fellowship Award:

Advanced processing physics of micro moulding and die drawing of polymers for control of properties

Prof Yongfeng Men, Changchun CIAC Chinese Academy of Sciences &
Prof Phil Coates FREng, Polymer IRC, Bradford

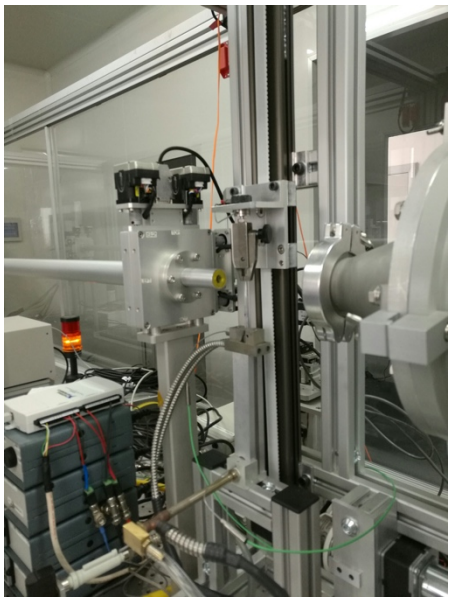
The focus of the proposed research is understanding and control of polymer morphology via melt and solid phase orientation processing routes to obtain enhanced product properties. We focus on commercially available polylactic acids (PLA) and polyolefins, which are of interest for their biomedical and mechanical applications.

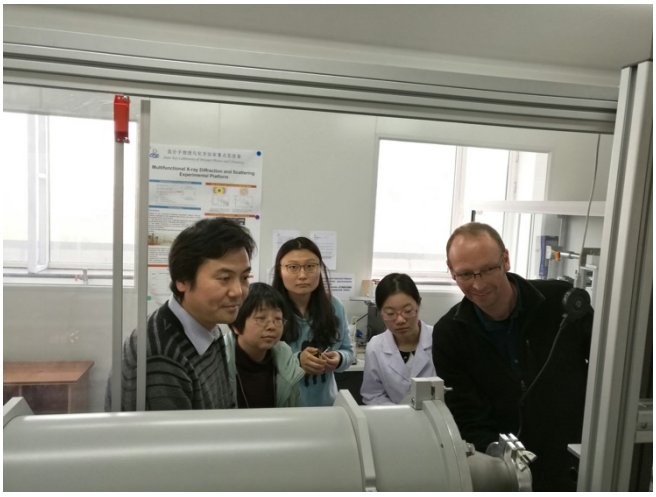
Objectives

(i) to understand hierarchical process structuring during micro molding and die drawing of typical semi-crystalline polymers;

(ii) to build relationships between morphology and mechanical properties of specially structured polymer products;

(iii) to establish inter-linkages among polymer molecular parameters, processing conditions and mechanical properties for tailor-making smart polymeric products out of ordinary materials using the advanced processing technologies.





Bradford die-drawing equipment installed in the X-ray beam line at Changchun CIACAS

Programme start date 1 September 2015; duration 3 years.

Budget: £111k from the Royal Society Newton Fund.

Expert Support includes Fin Caton-Rose, Ben Whiteside, Tim Gough and Glen Thompson; Yuqing Lai, Zhiyong Zhang, Jidong Zhang.

Journal Publications associated with the Science Bridges China/ UK-China AMRI platform

An excellent range of high quality journal papers – a growing pipeline – in strategic topics have arisen from the Science Bridges China/ UK-China AMRI platform, particularly through Researcher Exchanges and joint research programmes.

Li H-Y, Yin X-Z, Ji J-Q, Sun L-X, Shao Q, York P, Xiao T-Q, He Y, Zhang J-W,
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X-W Zhao, L Ye, P D Coates, F Caton-Rose, M Martyn,
Structure and blood compatibility of highly oriented poly(lactic acid)/thermoplastic polyurethane blends produced by solid hot stretchingPolymers for Advanced Technologies 09/2013; 24(9): 853-860, DOI: 10.1002/pat.3156

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Science Bridges China
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GLOBAL ENGAGEMENTS

RESEARCHER EXCHANGES

China to UK – Science Bridges China supported

Title	Surname	Firstname	Institution	Visiting Institution	Project	Start	End
Dr	Chen	Ning	Sichuan University	UoB	Poly(vinyl alcohol)-based composite products for drug delivery	29/06/2011	24/07/2011
Dr	Fei	Guoxia	Sichuan University	UoB	Solid phase processing of PLA based blends and composites for blood-contacting medical devices	29/06/2011	24/07/2011
Dr	Wu	Hong	Sichuan University	UoB	Effects of ultrasound on molecular structure development and drug release behaviors of PLA.	29/06/2011	24/07/2011
Dr	Zhao	Xiaowen	Sichuan University	UoB	Electrically Conductive Polyurethane/Carbon Nanotubes Composites for Medical Microdevices	29/06/2011	24/07/2011
Dr	Dong	Xia	ICCAS	UoB	Orientation Study of PA1012 Material by Microinject Preparation	13/01/2012	25/01/2012
Dr	Liu	Guoming	ICCAS	UoB	Characterization of the spatial distribution of microinjection parts by micro-beam X-ray scattering	13/01/2012	25/01/2012
Dr	Jiang	Zhiyong	CIACCAS	UoB	Structure and Properties of Micro-Molded Poly(ε-caprolactone) and Its Miscible Blends	12/05/2012	12/06/2012
Dr	Gao	Ying	CIACCAS	UoB	Correlation between Thermal Analysis and X-ray Diffraction of Micro Moulding Polypropylene	08/06/2012	06/07/2012
Dr	Lin	Xiang	BUCT	UoB	Geometrical dependence of shear viscosity in capillary flowing: slip behaviour and pressure sensitivity	06/09/2012	01/10/2012
Dr	Bai	Shibing	Sichuan University	UoB	Preparation of Waster PP/PE Material with High Performance by Pan-milling and Biaxial Stretching	15/09/2012	07/10/2012
Dr	Chen	Ning	Sichuan University	UoB	Poly(vinyl alcohol)-based composite products for drug delivery	15/09/2012	07/10/2012
Dr	Fei	Guoxia	Sichuan University	UoB	Solid phase processing of PLA based blends and composites for blood-contacting medical devices	15/09/2012	07/10/2012
Dr	Wu	Hong	Sichuan University	UoB	Effects of ultrasound on molecular structure development and drug release behaviors of PLA.	15/09/2012	07/10/2012
Mr	Yin	Xianzhen	SIMM	UoB	taste masking, architecture of DDS and extrusion materials	13/01/2012	21/01/2013

RESEARCHER EXCHANGES

Prof	Zhang	Jiwen	SIMM	UoB	taste masking, architecture of DDS and extrusion materials	13/01/2012	21/01/2013
Ms	Guan	Yinyan	ICCAS	Sheffield University	Highly Branched Poly(N-isopropyl acrylamide) Copolymers with Imidazole End Group	03/01/2013	02/02/2013
Ms	Jiang	Xiujuan	BUCT	UoB Durham and Sheffield	Evaluation of bioelastomers application for a novel artificial cervical disc	05/02/2013	20/03/2013
Dr	Liu	Ying	BUCT	UoB	Rheology of polymers for extrusion based microchannel production	05/02/2013	20/03/2013
Ms	Meng	Limin	BUCT	UoB	Investigation on the rheological behavior for polymer in micro channel	18/02/2013	20/03/2013
Ms	Xue	Jiajia	BUCT	UoB	Electrospun Anti-inflammation Drug-loaded Guided Tissue Regeneration Membrane	20/02/2013	20/03/2013
Mr	Guo	Zhen	SIMM	UoB	Establishment of Evaluation and Prediction Models for Properties of Compounds based on QSPR	04/03/2013	26/03/2013
Dr	Jiang	Zhiyong	CIACCAS	UoB	Structure and Properties of Micro-Molded Poly(ε-caprolactone) and Its Miscible Blends	24/11/2013	23/12/2013
Dr	Li	Li	Sichuan University	UoB	structure formation and development of PVA-based composites during micro-processing and biaxial stretching	14/10/2013	12/02/2014
Dr	Lin	Xiang	BUCT	UoB	Capillary Rheology, Die drawing (biaxial), Rotational Rheology, and actuator and micro sensors with dielectric materials in seeking potential application of microinjection for the constructions of micro sensors	08/03/2015	06/04/2015
Ms	Wang	Lili	ICCAS	UoB	investigation of the microstructure distribution and crystallization transition of micro-injection long chain polyamide alloys	06/04/2015	26/04/2015
Mr	Yin	Xianzhen	SIMM	UoB	micro-needles array preparation	09/09/2015	19/09/2015
Ms	Cui	Yang	ICCAS	Nottingham University	Manufacture, Characterisation, and Investigation of Particles on a Precisely Defined Scale	31/05/2016	30/06/2016

RESEARCHER EXCHANGES

Chinese Scholarship Council Awards

Prof	Chen	Yinghong	Sichuan University	UoB	Structure-Property Relationship of Polymer Nanocomposite under Micro-Processing Conditions	10/01/2011	12/01/2012
Prof	Yang	Qi	Sichuan University	UoB	Study on HDPE/UHMWPE blends through Die drawing method	13/04/2011	14/04/2012
Prof	Liu	Hesheng	Shangrao Normal University	UoB	computer modelling of polymer processing	26/11/2012	21/12/2012
Mr	Li	Dongxu	Sichuan University	UoB	micro processing of polymers	27/03/2013	27/03/2014
Dr	Li	Li	Sichuan University	UoB	structure formation and development of PVA-based composites during micro-processing and biaxial stretching	14/10/2013	12/02/2014
Mr	Han	Rui	Sichuan University	UoB	Preparation and characterization of High-performance Polypropylene and Polypropylene based composites via Solid Phase Processing	14/10/2013	11/10/2014

Royal Academy of Engineering research exchange award (10 months)

Dr	Jiang	Zhiyong	CIACCAS	UoB	Deformation and fracture behaviour of polymer materials - RAE Fellowship	08/07/2014	14/05/2015

RESEARCHER EXCHANGES

Royal Society Newton Advanced Fellowship

(Prof Yongfeng Men of CIACCAS and Prof Phil Coates of UoB, 09/2015-09/2018)

Dr	Ying	Lu	CIACCAS	UoB	Advanced processing physics of micro molding and die drawing of polymers for control of properties	02/01/2016	30/01/2016
Prof	Yongfeng	Men	CIACCAS	UoB	Advanced processing physics of micro molding and die drawing of polymers for control of properties	24/01/2016	30/01/2016
Dr	Yuqing	Lai	CIACCAS	UoB	Advanced processing physics of micro molding and die drawing of polymers for control of properties	18/07/2016	15/08/2016
Prof	Yongfeng	Men	CIACCAS	UoB	Advanced processing physics of micro molding and die drawing of polymers for control of properties	18/07/2016	15/08/2016
Dr	Caton-Rose	Fin	UoB	CIACCAS	Advanced processing physics of micro molding and die drawing of polymers for control of properties	16/10/2016	21/10/2016
Dr	Thompson	Glen	UoB	CIACCAS	Advanced processing physics of micro molding and die drawing of polymers for control of properties	22/10/2016	30/10/2016
Dr	Whiteside	Ben	UoB	CIACCAS	Advanced processing physics of micro molding and die drawing of polymers for control of properties	01/12/2016	05/12/2016
Dr	Nair	Karthik	UoB	CIACCAS	Advanced processing physics of micro molding and die drawing of polymers for control of properties	01/12/2016	05/12/2016

Sichuan Province International Scientific and Technological Cooperation and Exchange Project

(Prof Lin Ye of Sichuan University and Dr Fin Caton-Rose of UoB, 01/2015-12/2017)

Ms	Li	Zhengqiu	Sichuan University	UoB	High microfibrillation of PLA bone fixation material and its biological properties	07/09/2015	09/10/2015
Dr	Caton-Rose	Fin	UoB	Sichuan University	High microfibrillation of PLA bone fixation material and its biological properties	10/10/2016	15/10/2016

RESEARCHER EXCHANGES

Sinopec/Bradford Project (10/2013-06/2017)

Dr	Dali	Gao	SINOPEC	UoB	Solid Phase Orientation Processing of Selected Polymers	28/06/2016	23/09/2016

UK to China - Science Bridges China supported

Mr	Ambardekar	Rohan	UoB	Changchun	Crystalisation/Orientaton	27/02/2013	31/03/2012
Prof	Paradkar	Anant	UoB	Sichuan University	processing and preparation of pharmaceuticals using the Solid State Shear Milling (S3M) technology	17/12/2012	22/12/2012
Mr	Korde	Sachin	UoB	Sichuan University	processing and preparation of pharmaceuticals using the Solid State Shear Milling (S3M) technology	17/12/2012	26/12/2012
Mr	Pagire	Sudhir	UoB	Sichuan University	processing and preparation of pharmaceuticals using the Solid State Shear Milling (S3M) technology	17/12/2012	28/12/2012
Dr	Tuinea-Bobe	Cristina	UoB	Sichuan University	on injected moulded PEEK samples crystallisation phases' analysis via TEM	15/03/2013	28/03/2013

Venue

Multiple-function Hall #7/#8， Days Hotel & Suites DADING

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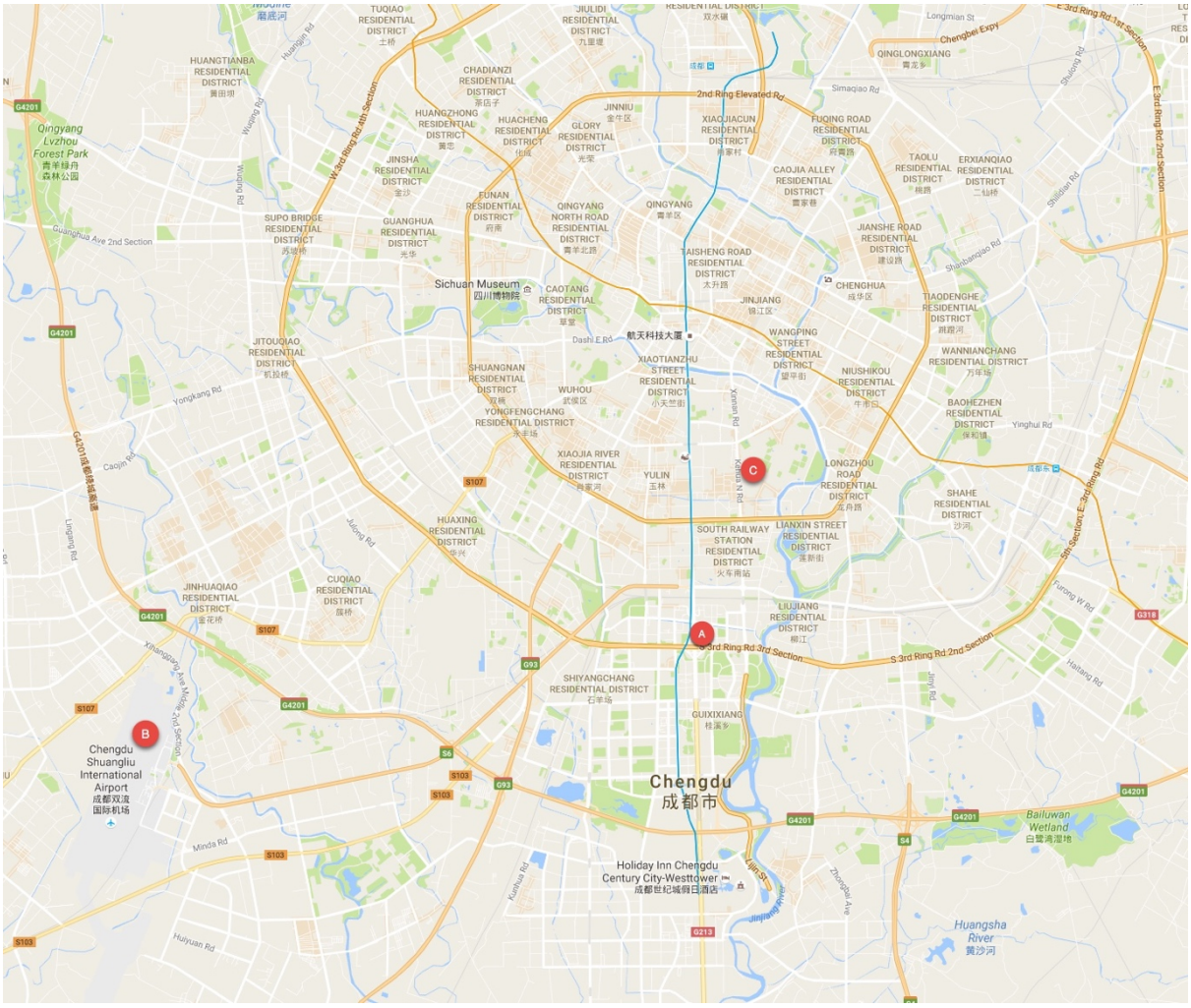
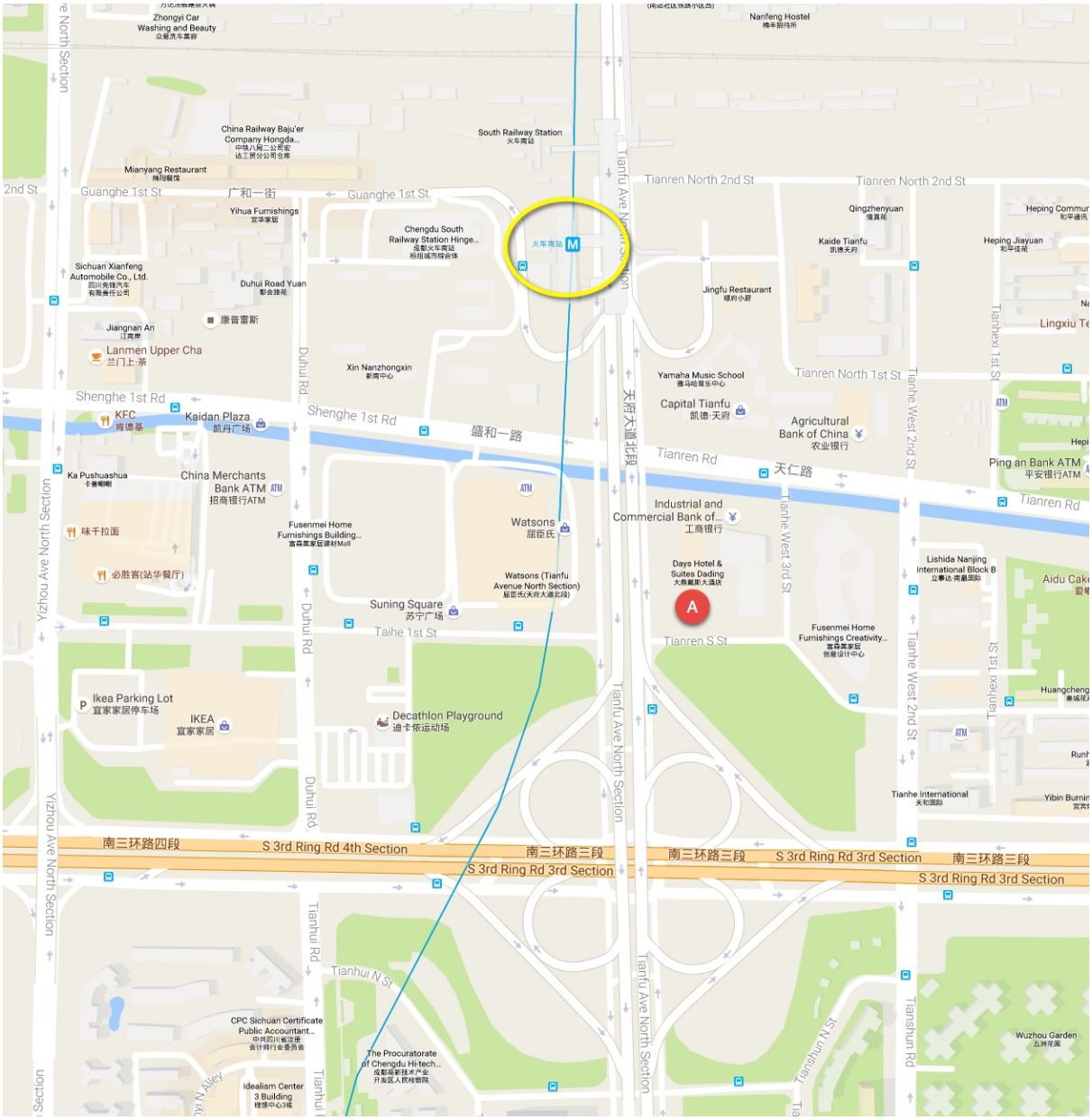


A Conference Venue – Days Hotel & Suites

B Chengdu Shuangliu International Airport

C State Key Laboratory for Polymer Materials Engineering, Sichuan University



Conference Hotel neighbourhood, including U1 Metro line station

Days Dading Hotel

Attendees

Title	Surname	First Names	Institution	Email
Workshop Chairs				
Prof	Coates	Phil	University of Bradford	p.d.coates@bradford.ac.uk
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Dr	Twigg	Pete	University of Bradford	P.Twigg@bradford.ac.uk
Prof	Ye	Lin	Sichuan University	yelinwh@126.com
Guest Speakers				
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	Jin	Sarah	Senior Trade & Investment Officer, Dept for International Trade, British Consulate General Chongqing	Sarah.Jin@fco.gov.uk
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