BRITISH COUNCIL

RESEARCHER LINKS

Newton Fund

Research Profile

Name: **Dr Ben Whiteside**

Position: **Senior Lecturer**

Institute/division: **RKT Centre for Polymer Micro and Nano Technology**

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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:

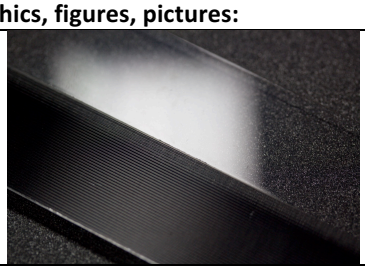
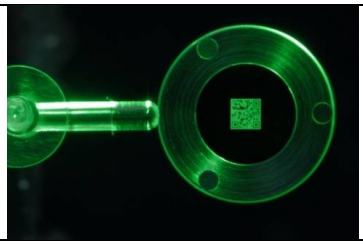
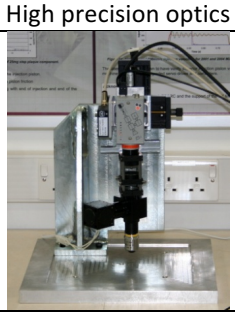
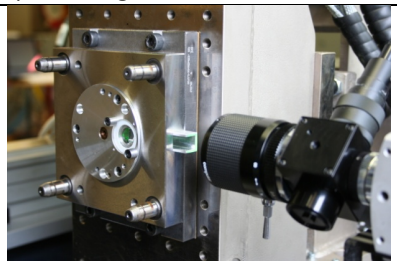
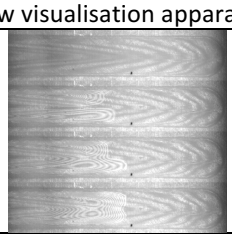
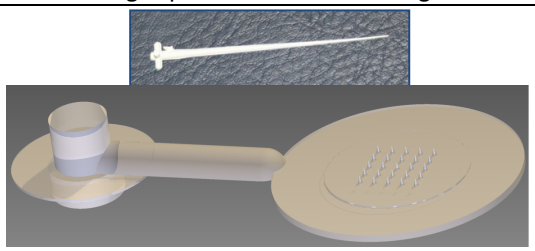
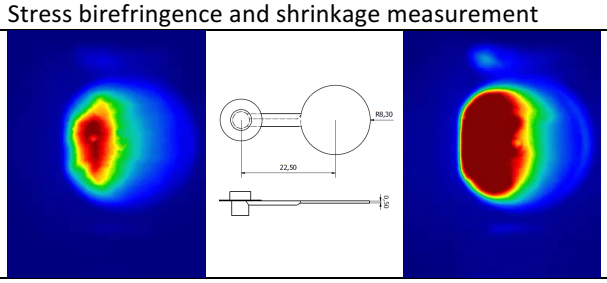
Surface structuring of polymeric devices using feature replication, material-specific behaviour, crystallisation properties and post processes including plasma treatment or embossing.

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:

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

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