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**
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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

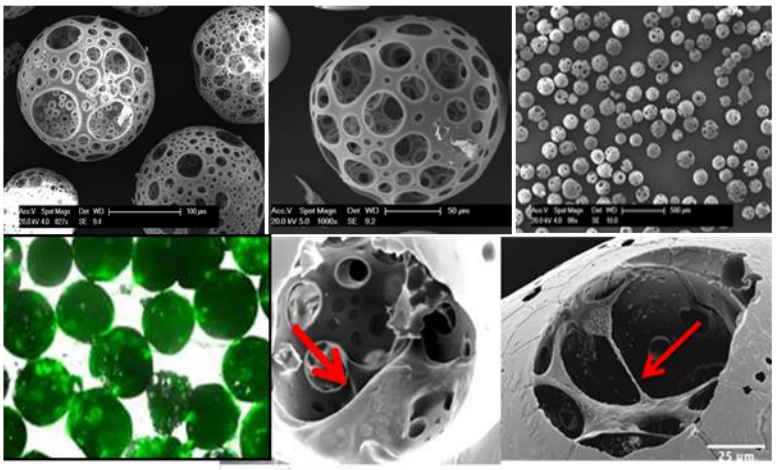

Figure 1: **Patent filed porous glass microsphere technology based on controlled porosity of inorganic microspheres with interconnected porosity (above images reveal that up to 80% porosity can be achieved within each microsphere). Recent feasibility studies show stem cells colonised on and within the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