Science Bridges China Research Profile

Name: **Stephen Rimmer**

Position: **Prof. Polymer and Biomaterials Chemistry**

Institute/division: **University of Sheffield, Chemistry**
Email: **s.rimmer@sheffield.ac.uk**
Tel: **0114 222 9565**

SUMMARY OF MY RELEVANT RESEARCH AREAS:

Polymer synthesis and biochemical interactions with cells and biomolecules: especially bioresponsive materials and peptide-functional polymers

高分子合成，生物化学与细胞及生物分子的相互作用：尤其是在生物相应材料和肽功能性聚合物方面。

Primary Research interests:

Polymer synthesis and biochemical interactions with cells and biomolecules: especially bioresponsive materials and peptide-functional polymers:

I am very active in the area of polymers that respond, by passing through a coil-to-globule transition in aqueous media, on binding to cells. We have successfully produced polymeric systems, based on highly branched acrylamide polymers with ligands at chain ends, that respond to the presence of pathogenic bacteria. It will be possible in the future to produce similar materials that respond to fungi, viruses, immune cells and most other entities with strong affinities for the end group ligands. We are keen to find new applications for these materials and envisage key applications in infection and possible areas such as water purification and detection of contamination.

Topics in which you would like to develop collaborative research:

We are keen to find new applications for polymer materials that respond to the presence of pathogenic bacteria and envisage key applications in infection and possible areas such as water purification and detection of contamination.

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

Active collaborations with tissue engineers (MacNeil (Sheffield); Hatton(Sheffield); Southgate(York)), microbiologists (Douglas(Sheffield)) and soft matter/nanophysicists (Geoghegan(Sheffield))

Relevant graphics, figures, pictures:

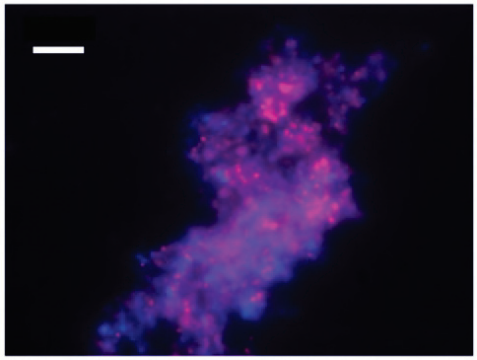

Figure 1, A highly branched poly(N-isopropyl acrylamide) functionalised with polymyxin ligands (blue) bound to *Pseudomonas aeruginosa* (red)

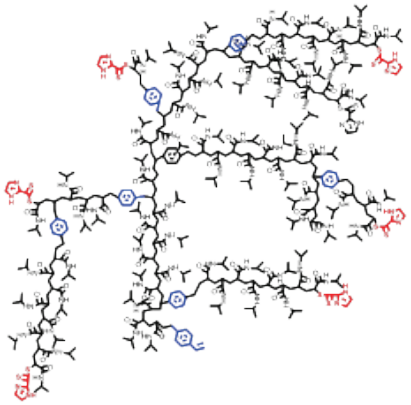

Figure 2, A typical highly-branched poly(N-isopropyl acrylamide) in this case with imidazole end groups

Publications and other outputs relevant to your interest in this programme

1. "Highly Branched Poly(N-isopropylacrylamide) for Use in Protein Purification" S. Carter, S. Rimmer, R. Rutkaite, L. Swanson, J. P. A. Fairclough, A. Sturdy, M. Webb *Biomacromolecules*, **7** 1124 (2006)
2. "Highly branched Poly-(N-isopropyl acrylamide)s with Arginine-Glycine-Aspartic acid (RGD) or COOH chain ends that form sub-micron stimulus responsive particles above the critical solution temperature" S. Rimmer, S. Carter, R. Rutkaite, J. W.Haycock, L. Swanson, *Soft Matter*, 3 971 (2007)
3. "Temperature dependent phagocytosis of highly branched poly(N-*iso*propyl acrylamide-co-1,2 propandiol-3-methacrylate)s prepared by RAFT polymerization" S. Hopkins, S. Carter, L. Swanson, S. MacNeil, S. Rimmer, *J. Mater. Chem.,* **17** 4022 (2007)
4. "Sub-micron poly(N-isopropyl acrylamide) particles as temperature responsive vehicles for the detachment and delivery of human cells" S. Hopkins, S.R. Carter, J.W. Haycock, N.J. Fullwood, S. MacNeil, S. Rimmer, *Soft Matter*, **5** 4928 (2009)
5. "Binding bacteria to highly branched poly(N-isopropyl acrylamide) modified with vancomycin induces the coil-to-globule transition" J. Shepherd, P. Sarker, K. Swindells, I. Douglas, S. MacNeil, L. Swanson, S. Rimmer, *J. Am. Chem. Soc.*, **132** 1736 (2010)
6. "Hyperbranched poly(NIPAM) polymers modified with antibiotics can both bind bacteria and reduce Gram-negative and Gram-positive bacterial burden in infected human tissue engineered skin" J. Shepherd, P. Sarker, S. Rimmer, L. Swanson, S. MacNeil, I. Douglas, *Biomaterials*, **32** 258 (2011)
7. "Highly-branched polymers with polymyxin end groups responsive to Pseudomonas aeruginosa" P. Sarker, J. Shepherd, K. Swindells, I. Douglas, S. MacNeil, L. Swanson, S. Rimmer, *Biomacromolecules*, **12** 1 (2011)