



# Nanopeptide

Peptides as  
Nanomaterials & Biomaterials **2012**

Manchester, UK: November 12-14, 2012

Dr Stephen Hoare t/a Peptide Conferences

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## Meeting Report

### Nanopeptide 2012: Peptides as Nanomaterials and Biomaterials

The Nanopeptide 2012 conference attracted 90 delegates and speakers and covered all aspects of peptide biomaterials, from physics and biophysics, through chemical and analytical techniques, through to biomedical applications. The conference was held from November 12 – 14, 2012 at the Manchester Institute of Biotechnology (MIB), University of Manchester under the auspices of the European Peptide Society, the Macro Group UK, the British Biophysical Society and the Protein & Peptide Science Group of the Royal Society of Chemistry. The conference was organised by Stephen Hoare (Peptide Conferences) and the programme committee was Aline Miller (Manchester), Louise Serpell (Sussex) and Rein Ulijn (Strathclyde).

The meeting began with an excellent keynote lecture from David Kaplan (Tufts University, USA) who set the scene with his talk on “Silk Peptides in Block Copolymers for Structure-Process-Property Relationships” featuring his work on silk-based block copolymers to address the challenge of synthesis, processing and structure/function. Several of the themes covered in his talk were taken up by other speakers on subsequent days. After David Kaplan’s lecture everyone enjoyed a welcome reception that set the tone for the friendly nature of the meeting.

The second day began with a session on ‘Peptide Design’ during which Dek Woolfson (Bristol, UK) described his work in designing a ‘peptide toolkit’ for use in assembling large structures. This was followed by four talks on peptide fibrils and nanotubes. Jeff Hartgerink (Rice University, USA) described his ‘Collagen Design Engine’, a simple genetic algorithm which utilizes pairwise interactions to generate sequences of stable collagen heterotrimers and Louise Serpell (Sussex, UK) talked about her work in designing functional materials based on normally pathological amyloid fibrils. Vince Conticello (Emory University, USA) discussed the fundamental interactions driving the formation of peptide nanotubes from coiled-coil assemblies.

The next session, ‘Peptide Biomaterials and Tissue Regeneration’ addressed perhaps the most exciting area of biomedical application of peptide biomaterials. There were seven talks, either side of lunch that covered a range of applications such as peptide assemblies as cell scaffolds and immune adjuvants (Joel Collier, University of Chicago, USA) or the use of elastin-based protein and peptide scaffolds to promote cell attachment, proliferation and tissue repair in 3D (Tony Weiss, University of Sydney, Australia). Aline Miller (University of Manchester, UK) took the design rules described in the first session as the basis of her group’s work on rules for introducing bioactivity and responsiveness into the gelled state of self-assembled peptide fibrils that have applications in regenerative medicine. Thomas Scheibel (Universität Bayreuth, Germany) described their methods for bioengineering spider silk proteins that took recombinant proteins mimicking natural silk and developed spinning techniques to produce protein threads closely resembling natural spider silk fibres.

A meeting held under the auspices of the British Biophysical Society, Macro Group UK, Protein & Peptide Science Group of the Royal Society of Chemistry and supported by the European Peptide Society.



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**Programme Committee:** Dr. Aline Miller (Manchester), Prof. Louise Serpell (Sussex), Prof. Rein Ulijn (Strathclyde).

## Nanopeptide 2012: Peptides as Nanomaterials & Biomaterials

After the afternoon coffee break, Hiroshi Matsui (Hunter College, CUNY, USA) talked about reconfigurable 3D superstructures made from collagen peptides and metal nanoparticles that were used as the basis of autonomous biochemical motors. This session, 'Peptide Interactions with Materials & Nanomaterials', also featured a range of other contributed talks.

A highlight of the meeting was the poster session that brought day 2 to a close. There were 40 posters, most of which were competing for the poster prize for young researchers sponsored by the Protein & Peptide Science Group of the Royal Society of Chemistry. The five poster judges had a difficult task and commented on the exceptionally high standard of the posters. In the end, a winner was chosen and, at the end of the meeting a cheque for £100 was presented to Marion Limo of Nottingham Trent University, UK for her poster "Peptide Templated Morphology Modification and the Application of Isothermal Titration Calorimetry (ITC) Towards an Understanding of Peptide-Mineral Interactions".

The first session on day 3, 'Dynamic Peptide Systems & Self-assembly' should have started with a talk from Rein Ulijn (University of Strathclyde, UK) but, unfortunately, he was taken ill overnight and had to return home. Happily, he is recovered, but his presence at the meeting was missed. Gonen Ashkenasy (Ben Gurion University, Israel) spoke a little earlier than planned and described his work on two replication systems, one based on coiled-coils, the other on  $\beta$ -sheets. Other talks in this session included contributions from Alvaro Mata (Parc Cientific Barcelona, Spain), Jason Kalapothakis (University of Edinburgh, UK), Meital Reches (Hebrew University of Jerusalem, Israel), Anders Augderhorst-Roberts (University of Cambridge, UK) and Marta Oxczarz (ETH Zürich, Switzerland).

A busy morning was brought to an end by a session on 'Peptide Hydrogels'. Joel Schneider (National Cancer Institute at Frederick, USA) described how hydrogels made from self-assembling  $\beta$ -hairpin peptides that were designed to encapsulate therapeutics were found to have inherent anti-bacterial activity. Bing Xu (Brandeis University, USA) discussed the use of enzymes to instruct the self-assembly of small peptides and other bioactive molecules for hydrogelation that can take place in vitro or in vivo and extra- or intra-cellular.

After lunch, the session on 'Peptide / Polymer Interactions' featured a talk by Hans Börner (Humboldt-Universität zu Berlin, Germany) on the programming and regulating the self-assembly of peptide-polymer conjugates and one by Ian Hamley (University of Reading, UK) on the self-assembly and biomedical applications of peptide / amyloid copolymers.

A final session on 'Peptide Nanostructures for Opto/Electronic Applications' featured just one talk, from Mariano Venanzi (University of Rome Tor Vergata, Italy) on photocurrent generation by self-assembled monolayers formed by conformationally constrained peptides functionalized with antenna chromophores and covalently linked to gold electrodes. It is hoped to be able to cover more of this subject in the future.

The conference was marked not just by the excellence of the invited speakers, but also by the active participation of many young researchers. The MIB proved to be a great location for a meeting of this size; although the double-screen of the lecture theatre proved challenging for some speakers, the layout of the venue and the timing of the programme allowed for much productive informal discussion. The response of speakers delegates was universally positive and the organizer and programme committee are already looking forward to Nanopeptide 2014.

The organizer would like to thank the various learned societies under whose auspices the conference was held for their support and encouragement as well as to the PPSG of the Royal Society of Chemistry for their sponsorship of the Poster Prize and the EPS for financial support.