SYLICA LECTURE:

Biopolymer Combinatorial Rheology:
Linking structure to function with silk

You are cordially invited to the lecture delivered by

Dr. Chris Holland

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WHEN: 11/03/2014, 10:30

WHERE: 4th floor, Faculty of Chemistry, Brno University of Technology, Purkyňova 118, Brno

Abstract:

If we wish to mimic or copy silk we must first understand it. Understanding means not only knowing the relevant proteins but also knowing their function and, importantly, their structure - property relationships. And here is a gap in our present knowledge. Silk proteins have been patented by many research groups and companies and been expressed in bacteria, plants and animals. However it is processing that defines a silk, for unlike all other biological materials they are spun, not grown.

Silks are biological polymers that have evolved to be processed by controlled protein denaturation, a process with many similarities to amyloidogenesis (for the medic/biologist) and flow induced crystalisation (for the chemist/physicist). But no one, to our knowledge, has succeeded in successfully configuring, i.e., spinning those proteins into anything resembling the natural fibre neither in its microstructure (which is rather complex) nor in its mechanical properties (which are outstanding). I will propose that silks are a unique source of inspiration for the current challenges facing the synthetic polymer industry, provided we understand how to process them correctly.

My talk will provide an overview of Natures 400 million years of R&D into silk and our recent studies into combining rheology with microscopy, spectroscopy and scattering to better understand the importance of processing in this fascinating material. Finally we will discuss some potential future applications of high tech silk based products.