MAR13-2012-020460

Abstract for an Invited Paper
for the MAR13 Meeting of
the American Physical Society

Designing biomaterials exploiting beta-sheet forming peptides self-assembly

ALBERTO SAIANI, The University of Manchester

The use of non-covalent self-assembly to construct materials has become a prominent strategy in material science offering practical routes for the construction of increasingly functional materials for a variety of applications ranging from electronic to biotechnology. A variety of molecular building blocks can be used for this purpose, one such block that has attracted considerable attention are de-novo designed peptides. The library of 20 natural amino acids offers the ability to play with the intrinsic properties of the peptide such as structure, hydrophobicity, charge and functionality allowing the design of materials with a wide range of properties. The beta-sheet motif is of particular interest as short peptides can be designed to form beta-sheet rich fibres that entangle and consequently form hydrogels. These hydrogels can be further functionalised using specific biological signals or drugs by synthesising functionalised peptides that are incorporated into the hydrogel network during the self-assembling process. This functionalisation approach is very attractive has it does not require any chemistry avoiding therefore the use of additional potentially toxic chemicals. It also offers the possibility to introduce multiple functionalities in a straightforward fashion. The hydrogels can also be made responsive through the use of enzymatic catalysis and/or conjugation with responsive polymers. In this presentation we will discuss the design opportunities offered by these peptides to create new functional biomaterials.