SMALL-ANGLE SCATTERING STUDIES OF THE SELF-ASSEMBLY OF AMYLOID PEPTIDE FRAGMENTS AND COPOLYMERS

I.W.Hamley[1] and M.J.Krysmann[1]

[1]*Dept of Chemistry, University of Reading, Reading RG6 6AD, UK*

Email: I.W.Hamely@reading.ac.uk

There has been great interest recently in the fibrillisation of peptides, especially the amyloid beta (Aβ) peptide which is involved in diseases such as Alzheimer's. A recent review summarizes recent work on the fibrillisation of Aβ and fragments thereof.[1] We have recently commenced a study of the self-assembly of peptides and peptide copolymers based on a fragment KLVFF, corresponding to the core region of Aβ(16-20). Aβ self-assembly is driven by inter-molecular β-sheet self-assembly into fibrils.

Our peptides and peptide copolymers are prepared by automated solid phase peptide synthesis. PEG is attached to create diblock copolymers via use of Tentagel resins. I will present results on the self-assembly of peptides including KLVFF, hydrophobic variants FFKLVFF and AAKLVFF and PEGylated diblock copolymers of these peptides. Some preliminary results will also be presented for peptides containing the β-amino acid, β-alanine (which is expected to disrupt β-sheet formation and fibrillisation).

A fascinating range of self-assembled structures are being uncovered including fibrils, fibrillar gels and (probably!) vesicles. Self-assembly is studied in water for hydrophilic peptides and peptide copolymers and in organic solvents for hydrophobic peptides. Characterization methods for self-assembled morphology identification include SAX and, SANS together with SEM, TEM and SPM. The solid state morphology including crystallization of PEG is studied by simultaneous SAXS/WAXS. Secondary structure is probed off-line using congo red staining, circular dichroism, fluorescence and FTIR.

1. Hamley , I. W., Peptide Fibrillisation. *Angew. Chem., Int. Ed. Engl.* 2007, in press.