Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Hierarchically Organized Peptide Core-Silica Shell Hybrids AYSEGUL ALTUNBAS, NIKHIL SHARMA, DARRIN J. POCHAN, University of Delaware, Department of Materials Science & Engineering, JOEL P. SCHNEIDER, UNIVERSITY OF DELAWARE, DEPARTMENT OF CHEMSITRY & BIOCHEMISTRY COLLABORATION — A biomimetic approach was applied for the fabrication of a 3D hybrid network that displays hierarchical organization of an inorganic layer around an organic self-assembled peptide fibril template. The 20 amino acid peptide used in this study consisted of alternating hydrophilic (lysine) and hydrophobic (valine) residues flanking a four amino acid turn sequence in the center. After intramolecular folding into a beta-hairpin conformation on addition of a desired solution stimulus, this peptide self-assembles into a 3D network of entangled fibrils rich in beta-sheet with a high density of lysine groups exposed on the fibril-surfaces. The lysine-rich surface chemistry was utilized to create a silica shell around the fibrils. The mineralization process of the fibrils was initiated under physiological conditions by adding the silica precursor, tetramethyl orthosilicate, to the pre-assembled hydrogel, which results in a porous silica network that retains the mesoscale structure of the peptide fibril network. Structural characterization via Transmission Electron Microscopy, cryogenic-Scanning Electron Microscopy, Small Angle Neutron and X-ray Scattering and mechanical characterization via oscillatory rheology will be presented.

Aysegul Altunbas
University of Delaware

Date submitted: 18 Dec 2008 Electronic form version 1.4