Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Self-Assembly of Globular Protein-Polymer Diblock Copolymers

C.S. THOMAS, B.D. OLSEN, MIT — The self-assembly of globular protein-polymer diblock copolymers into nanostructured phases is demonstrated as an elegant and simple method for structural control in biocatalysis or bioelectronics. In order to fundamentally investigate self-assembly in these complex block copolymer systems, a red fluorescent protein was expressed in *E. coli* and site-specifically conjugated to a low polydispersity poly(N-isopropyl acrylamide) (PNIPAM) block using thiol-maleimide coupling to form a well-defined model globular protein-polymer diblock. Functional protein materials are obtained by solvent evaporation and solvent annealing above and below the lower critical solution temperature of PNIPAM in order to access different pathways toward self-assembly. Small angle x-ray scattering and microscopy are used to show that the diblock forms lamellar nanostructures and to explore dependence of nanostructure formation on processing conditions. Circular dichroism and UV-vis show that a large fraction of the protein remains in its folded state after conjugation, and wide angle x-ray scattering demonstrates that diblock copolymer self-assembly changes the protein packing symmetry.

C.S. Thomas
MIT

Date submitted: 18 Nov 2010 Electronic form version 1.4