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Structure-Properties Relationship of Hierarchically Ordered Large and Small Molecules Self-Assemblies. RONIT BITTON, DANIEL CARVAJAL, JASON MANTEI, YURI VELICHKO, KENNETH SHULL, SAMUEL STUPP, Northwestern University — Membranes formed by mixing high molecular weight hyaluronic acid (HA) and oppositely charged peptide amphiphiles (PAs) have been shown to have a unique hierarchically ordered structure which consists of three regions: an amorphous biopolymer layer, a narrow region of PA fibers parallel to the interface and a layer of fibers perpendicular to the interface. Understanding of the structure-property relationships in these self-assembling systems is a necessary step in designing these structures for specific applications. We have formed and characterized PA/polymer self-assembled membranes using different polyelectrolytes (alginate, λ -carrageenan, poly(acrylic acid) etc). SEM micrographs show that these assemblies have the same parallel/perpendicular fibers structure as the original HA/PA assembly. The mechanical properties and water permeability of these structures measured by membrane inflation techniques and osmotic swelling indicate that the polymer characteristics [i.e. Mw, charge density] are an important factor in determining structure formation, kinetics and final properties.

Ronit Bitton
Northwestern University

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