IOWA STATE UNIVERSITY
DEPARTMENT OF MECHANICAL ENGINEERING

Light-tunable fluids, self-propelling microcapsules and hemostatic biomaterials: The next generation of soft matter

Srinivasa R. Raghavan
University of Maryland, College Park

Tuesday, November 4, 11:00-11:50 a.m.
2004 Black

Abstract:
Our laboratory seeks to engineer the assembly of "building blocks" such as polymers, surfactants, or colloids into new types of complex fluids and soft materials. When such assembly is induced spontaneously by thermodynamic driving forces, it is called self-assembly. Alternately, when assembly is directed by bringing materials into contact at interfaces or around predefined templates, it is termed directed assembly. Both processes have their analogs in biology and nature, and both are of great technological interest.

This talk will provide illustrative examples of our work. We have created assemblies that respond to stimuli such as temperature, pH or light; an example of the latter are fluids whose viscosity can be varied million-fold by irradiation with light. Also, we have used microfluidic techniques to create microcapsules of biopolymers, which we have endowed with self-propulsive capabilities in the presence of a chemical fuel. We have also developed self-assembling biopolymers that are able to convert liquid blood into a gel; thereby, the materials stop bleeding from serious injuries. A startup company has been established to commercialize these "hemostatic" materials for military and civilian use.

Biography:
Srinivasa (Srini) Raghavan is the Patrick & Marguerite Sung Professor in the Department of Chemical & Biomolecular Engineering at the University of Maryland, College Park (UMD). He received his B.Tech. and Ph.D. in Chemical Engineering from the Indian Institute of Technology, Madras, and North Carolina State University, respectively. His research on self-assembly, nanostructured fluids and soft materials has resulted in more than 110 publications and 16 U.S. patents. He has received several national and University-wide awards for his teaching and his research (including the CAREER award from the National Science Foundation in 2004 and UMD "Invention of the Year" in 2009). A class of biomaterials developed in his lab are being commercialized by Remedium Technologies, a company he co-founded.