“Self-Assembled Soft Materials from Sugar Amphiphiles, and the In Situ Synthesis of Nanoparticles”

Presented by:

Professor George John

The City College of the City University of New York

Special Seminar

Friday, October 17, 2008
10:00 a.m.

423-B Rieveschl
Short Bio of George John:

George John was born in Kerala, the southwest costal state of India. After obtaining his Ph.D. (1993) in Chemistry from Kerala University, India under the mentorship of Dr. C.K.S Pillai, Regional Research Laboratory, Trivandrum, he held a postdoctoral position (1994) at the University of Twente, The Netherlands. Subsequently, he was a research scientist at the Agency for Advanced Industrial Science and Technology (AIST), Japan. In the fall of 2002 he joined the Rensselaeer Nanotechnology Center as a research faculty member and pursued his research interests in the area of soft materials. Currently, he is an Associate Professor of Chemistry, the City College of the City University of New York. His research interests are in the broad area of organic and macromolecular materials chemistry; specifically includes biobased organic synthesis, self-assembled soft nanomaterials for functional applications, templated synthesis of nanoparticles, green chemistry, understanding growth mechanisms of nanostructures and designing new structures and multifunctional nanocomposites. Prof. John’s research on biobased materials has been widely acclaimed in many journals and publications including Nature, Newsweek and New York Times.
ABSTRACT:

Self-Assembled Soft Materials from Sugar Amphiphiles, and the In Situ Synthesis of Nanoparticles

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The self-assembly of low molecular weight building blocks into nanoscale molecular objects has recently attracted considerable interest in terms of the bottom-up fabrication of soft nanomaterials. The building blocks currently used in supramolecular chemistry are synthesized mainly from petroleum-based starting materials. However, biobased organic synthesis presents distinct advantages for the generation of new building blocks since they are obtainable from renewable resources. Our research efforts are deeply devoted towards developing building blocks from renewable resources to generate soft materials such as new surfactants, liquid crystals, lipid nanotubes and molecular gels. Present talk illustrates few successful examples of generating self-assembled soft materials from agri-sources, through simple organic transformations and by enzyme catalysis. To take these materials to the next level, we successfully showed the utility of these hydrogels as drug delivery vehicles. Enzyme catalysis was used as a tool to make and break the hydrogels, which apparently triggered controlled drug delivery. Intriguingly, by combining biocatalysis, with principles of green and supramolecular chemistry, we developed building blocks-to-assembled materials. Also address the advances that have led to the understanding of chiral behaviour and the subsequent ability to control the structure of glycolipid nanostructures-derived from renewable resources-and the resulting impact of this on future material applications. The second part of the talk addresses the templated synthesis of nanoparticles using self-assembled soft materials.