

Title **Crafting Functional Nanomaterials for Solar Energy Conversion: From Nonlinear Block Copolymers to Monodisperse Nanocrystals with Precisely Controlled Dimensions, Compositions and Architectures**

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Date & Time Friday, June 5, 2015 4:30 p.m.

Place I²CNER Hall, Ito campus, Kyushu University

Abstract

Colloidal nanocrystals exhibit a wide range of size and shape dependent properties and have found application in a myriad of fields such as optics, electronics, mechanics, drug delivery and catalysis to name but a few. Recently, linear amphiphilic block copolymer micelles have been used as template for the synthesis of functional nanocrystals, but the thermodynamic instability of these micelles limits the scope of this approach. In this talk, I will elaborate general strategies for crafting a large variety of functional nanoparticles and nanorods with precisely controlled dimensions, compositions and architectures by using nonlinear block copolymers as nanoreactors. This new class of copolymers forms unimolecular micelles that are structurally stable under various experimental conditions and therefore overcomes the intrinsic instability of linear block copolymer micelles. Our approach enables the facile synthesis of organic solvent- and water-soluble nearly monodisperse nanoparticles and nanorods with desired composition and architecture, including core/shell and hollow nanostructures. I will demonstrate the generality of our approach for creating various sizes and architectures of metallic, semiconductor, ferroelectric, magnetic and luminescent nanoparticles and nanorods. I will also discuss their use in solar energy to electrical energy conversion as well as solar energy to chemical energy conversion.

About the Speaker

Dr. Zhiqun Lin is a Professor at the School of Materials Science and Engineering at the Georgia Institute of Technology. He started his career as an Assistant Professor in the Department of Materials Science and Engineering at the Iowa State University in 2004 and was promoted to Associate Professor in 2010. He moved to Georgia Institute of Technology in 2011 and became a Professor in 2014. His research interests include polymer-based nanocomposites, block copolymers, conjugated polymers, functional nanocrystals (metallic, magnetic, semiconducting, ferroelectric, multiferroic, upconversion and thermoelectric) of different architectures (plain, core/shell, hollow and Janus), solar cells (perovskite solar cells and dye sensitized solar cells), hierarchically structured and assembled materials, and surface and interfacial properties. He has published more than 150 peer reviewed journal articles (with an h-index of 46), 6 book chapters, and 2 books. Currently, he serves as an Associate Editor for Journal of Materials Chemistry A, and an editorial advisory board member for Nanoscale. He is a recipient of Frank J. Padden Jr. Award in Polymer Physics from American Physical Society, an NSF Career Award, and a 3 M Non-Tenured Faculty Award. He became a Fellow of Royal Society of Chemistry in 2014.

Host: Professor Atsushi Takahara

Co-hosted:

Kyushu branch of the Society of Polymer Science, Japan
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