From Supramolecular Chemistry to Nanotechnology: Assembly of 3D Nanostructures

The work in this talk integrates nanotechnology and supramolecular chemistry to control the self-assembly of 2D and 3D receptor-functionalized nanoparticles. The aim is to generate stable and ordered 3D nanoparticle structures while using molecular recognition, both for establishing stability and order as well as creating a functionality of the resulting structure. The host-guest complexation of β-cyclodextrin (CD) and its guest molecules, e.g., adamantane and ferrocene, are applied in this thesis to assist the nanoparticle assembly. Direct adsorption of supramolecular guest- and host-functionalized nanoparticles onto (patterned) CD self-assembled monolayers (SAMs) via multivalent host-guest interactions and layer-by-layer (LbL) assembly are demonstrated and characterized using a variety of techniques. The control over the reversibility and fine-tuning of the nanoparticle-surface binding strength in this supramolecular assembly scheme are extensively examined. Furthermore, the supramolecular nanoparticle assembly has been integrated with top-down nanofabrication schemes to generate stable and ordered 3D nanoparticle structures, with controlled geometries and sizes, on surfaces, other interfaces, and as free-standing structures.

About the Speaker

Dr. Ling obtained Bachelor Degree of Chemical Engineering, 1st Class Honors from the University of Adelaide, Australia in year 2000. She received her Master Degree of Chemical Engineering from the National University of Singapore (NUS) and Institute of Materials Research & Engineering (IMRE) in September 2004. She pursued her Ph.D research under the supervision of Prof. David Reinhoudt and Prof. Jurriaan Huskens at the University of Twente, Netherlands. In October 2008, she received her PhD degree, with thesis entitled “From Supramolecular Chemistry to Nanotechnology: Assembly of 3D Nanostructures”. She was awarded the 2009 IUPAC Young Chemist award for her PhD research.

She is currently a postdoctoral researcher in the group of Prof. Peidong Yang at the University of California, Berkeley, USA. Her post-doctoral research is supported by Rubicon fellowship from the Netherlands Organization for Scientific Research (NWO, NL).