



SEMINAR

Application of Polymers to Bionanotechnology: Dispersion and sorting of Single-walled Carbon Nanotubes and antibacterial effects

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10AM

Room 66-110

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Polymers are large molecules that may be easily tuned for diverse applications. The types of synthesis polymer methods that can be applied today include controlled polymerization such as ring-opening polymerization, controlled radical polymerization, etc. All these offer the scientists various strategies for designing diverse polymers such as block copolymers, glycosylated copolymers, low-boiling point solvent compatible polymers, and reactive polymers to tackle various challenges in achieving functional bionanomaterials.

Single-walled carbon nanotubes (SWNTs) may be used in diverse applications such as composites and electronics. However, a pre-requisite of their successful incorporation is that they need to be uniformly and finely dispersed which is not trivial since their surface area per unit mass is huge. We have developed various kinds of dispersing agents of SWNTs in water and organic solvents that achieve good dispersion of the nanotubes. We have also recently developed effective polymeric dispersing agents of the SWNTs using ring-opening polymerization to produce polyimide-block-polycaprolactone to facilitate their easy incorporation into composite casting in low boiling point solvents. We have also demonstrated a new chemical method (using naphthalene based azo dye, Direct Blue 71) that can selectively enrich semiconducting nanotubes with high purity and high yield. Based on these azo compounds, we have also developed a large scale carbon nanotube sorting technique that can achieve high purity (>99.0%) in a facile method.

We have also applied anionic ring opening polymerization technique to make glycosylated cationic peptides that are good antibacterial agents with good intrinsic bactericidal properties as well as potentiating capability of existing antibiotics.

Bio: Dr Mary Chan is presently a professor at the School of Chemical and Biomedical Engineering at the Nanyang Technological University Singapore (NTU Singapore). She is presently the Director of the Centre for Antimicrobial Bioengineering. Her expertise is in polymers for biotechnology and nanotechnology. She has developed various types of polymeric agents for dispersing and sorting carbon nanotubes. Her current interests are in antimicrobial coatings for cardiac catheters and wound dressings. Her hydrogel materials for various biomedical applications (contact lens and wound dressing) have been licensed to the companies.

She has recently been elected to being a Fellow of the America Institute of Medical and Biological Engineering. She is also an associate editor of the ACS Applied Materials & Interfaces. She is presently in the NTU President Advisory Committee and was the Acting Chair of the School of Chemical and Biomedical Engineering at NTU from 2011-2013. She obtained her BEng (Chem) and PhD (polymers) from the National University of Singapore and MIT respectively.