Research Interests

Nano-Colloidal Domain - where physics, chemistry, biology, and technology meet

Recent developments in many modern nano-technologies involve new materials or processes in which interfaces (or surfaces) and colloids play a crucial role. They reveal the interaction of a spectrum of disciplines in which physics, chemistry, biology, and technology intersect. Understanding and utilizing the special properties of molecules at interfaces constitutes goal of our research. These include some of the themes in nano-colloid science: novel surfactants, self-assembly, construction of supramolecular architecture, nanoconfiment and compartmentalization, fabrication of nanoparticulate thin films. A few of our current research topics which exemplify the breadth of our interests follows: vesicular drug delivery systems; creation of bio-inspired surfaces; microfluidics.

Representative Publications


Development of ethosome-like catanionic vesicles for dermal drug delivery

Novel vesicles prepared from ion-pair amphiphiles (IPAs) as carriers of hydrophilic (eg arbutin) and hydrophobic (eg vitamine E acetate) drugs may find potential applications in
cosmetics and transdermal drug delivery.

**Creation of bio-inspired surfaces by using of layer-by-layer (LbL) assembly strategy**

Bio-inspired surfaces with different functionalities such as antireflection, superhydrophobicity, superhydrophobicity, omniphobicity, self-cleaning characteristics, patterned/gradient wettability, and tunable adhesion are designed and fabricated by means of Langmuir-Blodgett (LB) deposition, electrostatic assembly, and self assembly. These surfaces may find potential applications in fluid handling and transportation, optical sensing, medicine, and as self-cleaning and antifouling materials operating in extreme environments.