

Interfacial Phenomena at Micro/Nano Scales and Applications in Energy and Life Sciences

By Professor Zuankai Wang

Department of Mechanical and Biomedical Engineering
City University of Hong Kong

ABSTRACT

Recent developments in nanotechnology have led to unprecedented potential to integrate various systems- e.g. mechanical, fluidic, electromechanical, or optical- into one chip for novel applications. As the result of the miniaturization, the interfacial phenomena at the micro/nano scales are dramatically different from at the macro scale. In the course of evolution, Nature has developed unique strategies to take advantage of interfacial phenomena for complex functions. Learning from Nature not only advances our basic understanding of interfacial phenomena at the micro/nano scales, but also gives us inspirations to create artificial materials and achieve desired functions by virtue of nanoengineering. In the first part of my talk, I will present the development of a novel superhydrophobic surface with micropyramidal nanograsped architecture that allows for enhanced dropwise condensation. I will show that the synergistic cooperation between the hierarchical structures is responsible for the enhanced performance. In the second part of my talk, I will discuss the reverse process of condensation: evaporation. Although evaporation phenomena on rough surfaces has received extensive study, the fundamental mechanism governing the slippery to sticky state (or Cassie to Wenzel state) transition remains elusive. I will show that the line tension at the triple-phase interface becomes important in the determination of the wetting transition. At the end, I will conclude with the impact of interfacial phenomena on the biomedical and life sciences, with an emphasis on our recent work on droplet microfluidics.

BIOGRAPHY

Zuankai Wang is an Assistant Professor in the Department of Mechanical and Biomedical Engineering at the City University of Hong Kong. He earned his Ph. D. degree in the Department of Mechanical, Aerospace and Nuclear Engineering at RPI in 2008. After a postdoc in the Department of Biomedical Engineering at Columbia he joined CityU in October 2009, where he has published in journals including Physical Review Letters, Advanced Functional Materials (front cover), Nanoscale, and Applied Physics Letters. His research work has been featured in media reports from Nature News, BBC Radio's Science in Action Program, Chemical & Engineering News, and MaterialsViews. Dr. Wang won the Materials Research Society Graduate Student Silver Award in 2007 Fall Meeting and Chinese Government Outstanding Self-Financed Students Abroad Award in 2007.



EVENT DETAILS

DATE:

Wednesday,
December 5, 2012

TIME:

1:30 PM

LOCATION:

Carnegie, Room 315
Stevens Institute of Technology

ATTENDANCE:

This event is open to Stevens' Faculty, Students, Staff, and Invited Guests