OMICS Group Conferences
Accelerating Scientific Discovery

2nd International Conference and Exhibition on
Materials Science & Engineering

October 7-9, 2013 Hampton Inn Tropicana, Las Vegas, USA

Precision manipulation, assembling, and actuation of nanoentities by electric tweezers

Donglei (Emma) Fan
The University of Texas at Austin, USA

Abstract

In this talk, I will discuss precision manipulation, assembling, and actuation of nanoentities by electric tweezers for ultrasensitive biochemical detection, single-cell drug delivery, and bottom-up assembling of nano-electromechanical system (NEMS) devices. Electric tweezers are our recent invention, which utilize combined DC and AC electric fields to manipulate nanoentities in suspension. Nanowires can be transported in both the X and Y directions along prescribed trajectories with a precision of at least 150 nm and rotated with controlled angle, velocity (to at least 26000 rpm) and chirality. Leveraging the unique electric-tweezer manipulation, we designed, synthesized, assembled, and rotated arrays of plasmonic Raman nanosensors and investigated their innovative sensing enhancement mechanisms for single-molecule and location-predictable biochemical detection. We delivered cytokine functionalized nanowires to a single live cell amidst many and studied signal transduction mechanisms. We readily determined the electronic properties of various nanomaterials from their mechanical rotation in a noncontact and non-destructive manner. We bottom-up assembled and synchronously actuated arrays of NEMS devices such as rotary nanomotors and nano-oscillators using nanoparticles as building blocks

Biography

Dr. Donglei (Emma) Fan is an Assistant Professor in the Department of Mechanical Engineering of the University of Texas at Austin since 2010. She received **National Science Foundation CAREER award** in 2012. She is also honored as a **Recognized Mentor** by Siemens Foundation. Dr. Fan obtained her bachelor's degree in chemistry from the Department of Intensive Instruction, an honor program for gifted youth, in Nanjing University, China, in 1999, doctoral (2007) degrees in Materials Science and Engineering from the Johns Hopkins University (JHU). Prof. Fan's work has spurred a series of publications on leading journals including Nature Nanotechnology, the Proceedings of National Academy of Sciences, Nano Today, Physical Review Letters, Advanced Materials, Advanced Functional Materials, Applied Physics Letters, as well as three patent disclosures. Her work was widely reported by the academic news media and funding agencies such as *Nature Nanotechnology*, *National Science Foundation*, *National Institutes of Health*, *MRS Bulletin*, *APS news*, and had been selected multiple times by the *Virtual Journals of Nanoscale Science and Technology*.