

**University of Rochester  
Department of Electrical and Computer Engineering  
Colloquia Series**

**Combing Nanowires for Applications from Computing to Bioelectronics.**

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**Wednesday, February 3rd  
12:00PM – 1:00PM  
CSB 209**

Abstract: The wide compositional, morphological, and surface properties achievable in synthesized nanowires afford unique performance advantages in devices ranging from computing elements to sensors. Post-synthetic control over the order and geometry of nanowires is central to device integration and realizing new functions. To this end, a novel combing technique utilizing shear forces for nanowire assembly is developed. By decoupling the force anchoring nanowires from force shearing and aligning these structures, we are able to obtain order of magnitude improvement in the alignment of nanowires. The introduction of pre-designed discrete anchoring sites enables deterministic fabrication of complex computing architectures, exemplified by the construction of a nanocomputer featuring structural and functional complexity beyond the start-of-art from bottom-up. Moreover, the combing technique enables nanowire assembly in the vertical, off-substrate dimension, producing three-dimensional (3D) transistor structures capable of both electromechanical and electrical potential sensing. We have used these new 3D devices for simultaneous electrical recording of action potential and mechanical contraction in cardiomyocytes. Prospects for these advances in enabling new platforms for electronic and bioelectronic interfaces will be discussed.

Bio: Dr. Jun Yao holds a B.S. in Electrical Engineering (2003) and an M.S. in Physics (2006) from Fudan University in China. He received his Ph.D. in Applied Physics (2011) from Rice University with Prof. James M. Tour (and co-advisers Prof. Douglas Natelson and Prof. Lin Zhong). His Ph.D. research involved the discovery and mechanistic characterization of an intrinsic resistive memory switching in silicon oxides, exploring applications leading to potential commercialization. He then moved to Harvard University as a postdoctoral fellow working with Prof. Charles Lieber, focusing on the synthesis, assembly, fabrication and integration of nanowires for nanoelectronics and bioelectronics. His recent focus is on engineering micro/nanoscale materials in 3D formats and integrating them on injectable electronic frameworks for expanding the functionality for bioelectronic interfaces.

Light Refreshments Provided