

Department of Materials Science and Engineering Seminar

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Engineering V, Room 2101



Controlled growth of semiconductor nanowires and heterostructures

Yi-Chia Chou, Ph.D.
Assistant Professor, Department of Electrophysics
National Chiao Tung University, Taiwan

Abstract:

The growth of semiconductor nanowires by the vapor-liquid-solid (VLS) and vapor-solid-solid (VSS) mechanisms takes place when the growth material, supplied from a gas phase species such as a chemical vapor deposition (CVD) precursor, dissolves into catalyst particles (liquid or solid, respectively) and precipitates at the catalyst/substrate interface. In order to gain a detailed understanding of this process at the atomic level, we examined nanowire growth *in situ*, to provide a direct view as growth takes place. We discuss observations made in two different instruments, an ultra high vacuum (UHV) TEM and an aberration-corrected environmental TEM (ETEM), by introducing an environmental friendly catalyst system which opens up the opportunity for nanowire growth in conventional non-UHV CVD systems. I will discuss new nanostructures in free standing nanowires and the integration between group IV nanowire and group III-V materials which are potentially useful in future nanodevices.

Biography:

Yi-Chia Chou received her B.Sc. degree in Materials Science and Engineering from National Tsing Hua University, Hsinchu, Taiwan, and Ph.D. degree from University of California Los Angeles, USA. Her Ph.D. research focused on nucleation and growth of nanoscale silicides by point contact reactions using *in situ* high resolution transmission electron microscopy (TEM). She was awarded UCLA Graduate Fellowship, Dissertation Fellowship and TSMC Outstanding Graduate Student Award for her dissertation work. After receiving her Ph.D. degree, she was a Postdoctoral Research Scientist in Physical Science Department at IBM T. J. Watson Research Center and co-affiliated as a Guest Scientist in Electron Microscopy Group at Brookhaven National Lab (BNL). Her postdoctoral research includes *in situ* controlled growth of Si/Ge heterojunction nanowires using novel catalysts, and UHVTEM and Cs-corrected ETEM growth of nanowires. She was awarded Presidential Postdoctoral Award from Microscopy Society of America for her work at IBM and BNL. She has given more than 10 invited talks in major international conferences and received invited review article invitations since 2010 for her research accomplished at UCLA and IBM. She joins Department of Electrophysics at National Chiao Tung University, Hsinchu, Taiwan since August 2012. Her current research interests include high performance transmission electron microscopy, solid state phase transformation in metal and semiconductors, and growth of novel nanostructures.