

Chemical Engineering Graduate Seminar



Dr. Zhong Lin (ZL) Wang
Georgia Institute of Technology

3:30 – 4:30 PM

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CPE 2.218

“Oxide Nanobelts: From Materials to Properties and to Emerging Applications”

Nanowire and nanotube based materials have been demonstrated as building blocks for nanocircuits, nanosystems and nano-optoelectronics. Ultra-long belt-like, quasi-one-dimensional nanostructures (so called nanobelts or nanoribbons) have been successfully synthesized for semiconducting oxides of zinc, tin, indium, cadmium and gallium, by simply evaporating the desired commercial metal oxide powders at high temperatures [1]. The belt-like morphology appears to be a unique and common structural characteristic for the family of semiconducting oxides with cations of different valence states and materials of distinct crystallographic structures. Using the technique demonstrated for measuring the mechanical properties of carbon nanotubes based on in-situ transmission electron microscopy [2,3], the bending modulus of the oxide nanobelts has been measured, and the nanobelt is shown to be a dual mode nanoresonator. Field effect transistors [4], ultra-sensitive nano-size gas sensors [5], nanoresonators and nanocantilevers [6] have also been fabricated based on individual nanobelts. Very recently, nanobelts, nanosprings [7, 8] and nanorings [9] that exhibit piezoelectric property have been synthesized, which could be a candidate for nano-scale traducers, actuators and sensors.

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