Northwestern | McCORMICK SCHOOL OF ENGINEERING

Materials Science and Engineering

2017 Dorn Memorial Lecture

Jerry Tersoff

Principle Research Staff
IBM Thomas J. Watson Research Center

Tuesday, January 31st

4:00pm, Tech L211

Reception to follow in Willens Wing Atrium

Morphology and Crystal Phase Selection in Nanowire Growth

Nanowires of GaAs and other III-V semiconductors are routinely grown from liquid catalyst droplets. Remarkably, the growth can be switched between zincblende and wurtzite crystal structure, simply by changing the gas pressure. These systems provide an ideal laboratory for studying the controlled formation of non-equilibrium crystal structures, which is one of the most important challenges in crystal growth. Controlled phase switching also enables novel nanowire device structures. Recent observations using in-situ transmission electron microscopy, together with theory, reveal how the phase is controlled in nanowire growth. The surprising explanation hinges on a small detail of the wire shape that wasn't even noticed until a few years ago. The story begins with earlier work showing how the growing wire is shaped by capillary forces from the catalyst droplet, and ends with untangling the mechanism of crystal phase selection.

Bio: Jerry Tersoff is a Principal Research Staff member at the IBM Thomas J. Watson Research Center. He has worked in diverse areas relating to the theory of surfaces, interfaces, materials physics, and device physics. His recent research includes semiconductor nanowire growth; nanoscale effects in heteroepitaxy, including stress-driven formation of quantum dots; and the physics of carbon nanotube devices. His early work includes theories of scanning tunneling microscopy, Schottky barriers, and heterojunction band lineups. He also developed model interatomic potentials that are widely used in materials simulations. His work has been recognized by the Davisson-Germer Prize of the American Physical Society, the Medard Welch Award of the American Vacuum Society, and the MRS Medal. He is a Fellow of the APS, AVS, and MRS. He is first author of 8 papers cited over 1000 times, and has an h-index of 81. He received his B.A. in Physics from Swarthmore College, and his Ph.D. in Physics from the University of California, Berkeley.

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