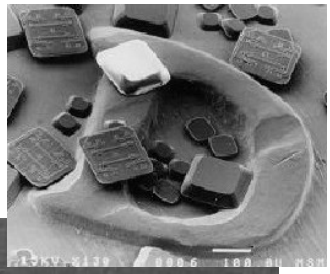
New Course Announcement

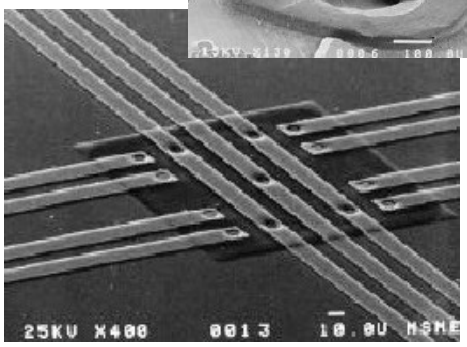
Self-assembly from Nano to Milli Scales

EE539C: Advanced Topics in Solid State Electronics

Instructor: Prof. Karl F. Böhringer, Electrical Engineering (karl@ee.washington.edu)
Spring Quarter: MW 1:30 – 3:20 pm, 4 credit hours



Self-assembly is the spontaneous organization of objects into ordered aggregate structures. Driven by energy minimization, self-assembly is ubiquitous in nature not only at the molecular scale (polymerization, formation of self-assembled monolayers, crystal growth) but also at larger scales (biological growth, and even in weather patterns).



Recently, successful demonstrations of engineered self-assembling systems have started to appear in several laboratories around the world, including some start-up companies. This comes at a time when electronics and microelectromechanical systems (MEMS) are maturing and there is an increasing desire to integrate complete microsystems with sensing and communications capabilities at the scale of a dust spec. But it is also increasingly evident that this cannot be achieved without fundamentally new manufacturing techniques: VLSI style microfabrication fails because of the inability to include the broad range of desired materials; robotic pick-and-place fails because of the tiny sizes and huge volumes of the needed components.

This new class will attempt to systematically study self-assembly as a novel manufacturing paradigm, and thereby find answers to engineering questions such as:

- How can we produce microscopic devices with sensing and communication capabilities at volumes of billions or more?
- How can we combine carbon nanotubes with silicon semiconductors for the next generation of integrated circuits?
- What are the broader technological and societal impacts if it becomes possible to mass-produce “smart motes” that may surround us in our homes, cars, and in public places?

The lecture is scheduled such that it does not conflict with the EE graduate courses in Nanofabrication (Prof. Parviz), Integrated Optics and Nanophotonics (Prof. Lin), and Concurrency (Prof. Klavins). Any of these classes is highly recommended as complement to EE539C.