Georgia Tech Study Targets Nanomanufacturing

Researchers have taken an important step toward high-volume production of new nanometer-scale structures with the first systematic study of growth conditions that affect production of one-dimensional nanostructures from the optoelectronic material cadmium selenide (CdSe).

Using the results from more than 150 different experiments in which temperature and pressure conditions were systematically varied, nanotechnology researchers at the Georgia Institute of Technology created a “road map” to guide future nanomanufacturing using the vapor-liquid-solid (VLS) technique.

The results join earlier Georgia Tech work that similarly mapped production conditions for nanostructures made from zinc oxide. Together, the two studies provide a foundation for large-scale, controlled synthesis of nanostructures that could play important roles in future sensors, displays and other devices.

Cadmium selenide has been studied for applications in optoelectronics, luminescent materials, lasing materials and biomedical imaging. It is perhaps best known as the basis for quantum dots that have applications in biomedical imaging.

Zinc oxide is a semiconducting, piezoelectric and optical material with potential applications in sensors, resonators and other nanoelectronic structures.

“Now that we have determined the optimal requirements for growth, it should be straightforward to scale up the production of these structures,” Wang concluded. “We have a lot of ideas for potential applications.”