Zinc Oxide Nanostructures: Growth, Properties and Applications
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ZnO nanomaterials are promising candidates for nanoelectronic and photonics. Compared with other semiconductor materials, ZnO has higher exciton binding energy (60 meV), is more resistant to radiation, and is multifunctional with uses in the areas as a piezoelectric, ferroelectric and ferromagnetic. ZnO-based semiconductor and nanowire devices are also promising for the integration on a single chip. So far, the various applications of ZnO nano materials such as biosensors, UV detectors and FED are under way.

Dr. Zhong Lin Wang, director of Georgia Tech's Center for Nanoscience and Nanotechnology, Atlanta reports that using a solid–vapour phase thermal sublimation technique, nanocombs, nanorings, nanohelixes/nanosprings, nanobelts, nanowires and nanocages of ZnO have been synthesized under specific growth conditions. He also summarizes the various growth morphologies and proposes their growth processes.

These unique nanostructures unambiguously demonstrate that ZnO probably has the richest family of nanostructures among all materials, both in structures and in properties. The nanostructures could have novel applications in optoelectronics, sensors, transducers and biomedical sciences.

The nanobelts and relevant nanostructures are a unique group that is likely to have important applications in nanosize electronic, optical, sensor and optoelectronic devices. The latest breakthroughs is the success of first piezoelectric nanobelts and nanorings for applications as sensors, transducers and actuators in micro- and nano-electromechanical systems, which was published in Science this year (Science, 303 (2004) 1348).

Find more about Zhong Lin Wang’s group at http://www.nanoscience.gatech.edu/zlwang/index.htm
The article *J. Phys.: Condens. Matter* 16 (2004) R829–R858 can be found here:
http://www.iop.org/EJ/abstract/0953-8984/16/25/R01


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