



BILKENT UNIVERSITY

unam - INSTITUTE of MATERIALS SCIENCE & NANOTECHNOLOGY

FACULTY OF SCIENCE

MATERIALS SCIENCE and NANOTECHNOLOGY GRADUATE PROGRAM SEMINAR

“Zinc Oxide Nanowires: From Synthesis to Applications”

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The large scale synthesis of wide ranging one dimensional nanowires with extraordinary properties have opened new pathways for incorporation into opto-electronic devices. Among semiconducting oxide nanowires, ZnO is one of the most promising materials with its direct wide bandgap and large exciton binding energy. One particular advantage of ZnO nanowires, as opposed to the other semiconducting nanowires/nanotubes, is that they can be synthesized both by solution approaches (at 80°C) and chemical vapor deposition methods (T>500°C), depending on the particular application. Solution growth approach for ZnO nanowires is highly appealing because of the low growth temperature and possibility for large area synthesis. Reported reaction times for ZnO nanowire synthesis, however, are too long spanning from several hours to days. In the first part of the talk, I will focus on the synthesis of the ZnO nanowires both at high and low temperatures and explain our rapid solution synthesis method. Next, I will talk about the applications of ZnO nanowires in flexible solar cells. In particular, ZnO nanowire /poly(3-hexylthiophene) (P3HT) organic photovoltaic devices will be presented as well as utilization of ZnO nanowires as scaffolds for the dye molecules in dye sensitized solar cells. Then, I will present large area macroelectronic devices based on ZnO nanowire networks that utilize a less lithographically intense alternative to individual nanowire devices. I will then give some preliminary results on the use of ZnO nanowires as an alcohol sensor. Finally, I will conclude my talk with our recent efforts on the growth of ZnO nanowires on vertically aligned carbon nanotube arrays and the field emission behavior of the resulting composite structure.

Date : December 17, 2009 (Thursday)

Time : 15:40

Place : Faculty of Science Building, A Block, Seminar Room (SA 240)

Tea and cookies will be served after the seminar