School of Nano Science

School of PHYSICS

IPM Condensed Matter & Statistical Physics Group

Weekly Seminar

Experimental investigation on the semiconductor micro/nanowire structures (Si, ZnO) for optoelectronic application

Invited speaker:

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Abstract:

In this work, one dimensional silicon and zinc oxide nanostructures were firstly synthesized and characterized. Then, the photoresponsivity of the fabricated heterojunction ultraviolet photodiode was investigated. In the first section, silicon nanowires(SiNWs) were fabricated by the cost effective metal assisted chemical etching method and the effects of metal type and its thickness (gold and silver) and the etching time on the structural and optical properties were studied. The results showed that silicon nanowires fabricated by gold are optically better candidate for optoelectronic applications. In the second section, zinc oxide nanorods(ZnO-NRs) on the glass and silicon substrates were synthesized through hydrothermal method. The effect of seed layer thickness on the structural and optical properties of the synthesized zinc oxide nanorods on the silicon was investigated. Seed layer thickness enhancement caused increase in nanorods length and improvement in crystal structures. Also by creating suitable ohmic contacts, the effect of seed layer thickness on the electrical properties of nanorods under dark condition and photoresponsivity of the fabricated device under UV illumination was investigated. Electrical characterization showed photoresponsivity enhancement as the seed layer thickness increased. In the third section, zinc oxide nanorods were synthesized on the silicon nanowires with different length and heterojunction photodiode(n-ZnO-NRs/p-iNWs) was fabricated. Electrical characterization under dark condition showed that output current was increased by the Silicon nanowires length increment. Finally, the photoresponsivity of the fabricated heterojunction photodiode with different length under UV illumination was evaluated. The results showed that silicon nanowires length increment caused the photoresponsivity of the samples to be decreased in the reverse bias.

Wednesday, 5th of Aban (1395) (October 26th, 2016), 14:00-15:00

Farmaniyeh seminar room