Synthesis and characterization of ZnO nanostructures for sensor application\textsuperscript{1} XIAOYAN PENG, JIN CHU, University of Puerto Rico, BOQIAN YANG, University of Massachusetts, PETER FENG, University of Puerto Rico, FENG TEAM — ZnO nanostructures including nanoparticles (diameter about 50nm), nanorods (diameter about 150 nm and length about 1-1.5$\mu$m) and nanoparticles (diameter $\sim$ 20 nm) were prepared onto Si (100) substrates using both r.f sputtering and PLD technique, respectively. Thermal annealing was performed at 800 $^\circ$C in atmosphere for 2 hours to improve the qualities of ZnO crystalline structures. X-ray diffraction, electron scanning microscope and Raman scattering have been used to characterize all these nanostructured samples. After synthesis and initial characterizations, the ZnO nanostructure-based field effect transistor sensors have been designed, fabricated, and tested. High sensitivity (few PPM), quick time response (less than 1 second) of the newly designed sensors have been achieved. Experimental data indicate that the sensitivity of the sensor highly relies on the operating temperature.

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