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Electrical and Optical Characterization of Cobalt Doped Nanostructured ZnO/p-Si Heterojunctions AMRIT KAPHLE, ECHO ADCOCK SMITH, PARAMESWAR HARI, DANIEL CRUNKLETON, TYLER JOHANNES, TODD OTANICAR, KENNETH ROBERTS, Univ of Tulsa — In this study we investigated electrical and optical properties of heterojunctions made of cobalt doped ZnO nanorods and Boron doped silicon (p-Si). ZnO nanorods were grown on a seed layer of Zn sputtered on p-Si using a chemical bath deposition technique. Cobalt percentage in the ZnO were varied from 0-20%. Scanning Electron Microscope (SEM) images indicate that the diameter of ZnO nanorods increased with higher cobalt doping. Room temperature photoluminescence shows an increase in the defect peak at 550 nm with increasing doping. Band gap was measured using UV-VIS spectroscopy. In addition, we also performed current-voltage (I-V), capacitance-voltage(C-V) measurements on ZnO/p-Si samples under both dark and illumination conditions. I-V characteristics show good rectifying behavior under dark and illumination conditions. The saturation current, diode ideality factor, carrier concentrations, built in potential, and barrier height were calculated from I-V and C-V measurements. We will discuss the implications of the band gap, I-V, and C-V measurements with variations in cobalt doping concentrations in ZnO/p-Si heterojunctions.

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