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Optical, electronic and electrical properties of nanostructured ZnO: Ge multilayered thin films ABDULLAH CEYLAN, SNTG Lab. Physics Eng. Dept. Hacettepe Univ. 06800, Beytepe, Ankara, Turkey, ABDUL RUMAIZ, National Synchrotron Light Source, Brookhaven National Laboratory — ZnO: Ge nanocomposite thin films with thickness of about 600 nm were synthesized by sequential r.f. magnetron sputtering followed by ex-situ rapid thermal annealing (RTA). RTA was explicitly chosen to avoid excessive Ge-oxide formation as well as minimizing diffusion of surface impurities into bulk of the samples. X-ray diffraction (XRD) patterns have revealed that ZnO preferentially grows along c-axis giving strong (002) diffraction peaks while Ge crystallizes in cubic structure showing no sign of oxide formation. Dark and light (white led) I-V measurements performed on the samples prepared on single crystalline Si substrates have revealed that there is a pronounced difference between the currents generated under dark and light conditions. Ge nanocrystals embedded ZnO structure has produced 4 orders of magnitude more current in logarithmic scale. These observations have been attributed to the quantum confinement effect due to Ge nanocrystals. Hard x-ray photoelectron spectroscopy has been used to probe the band alignment and confinement effects in Ge nanocrystals.

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