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Defect activated room temperature ferromagnetism in Co:ZnO films - micro-Raman studies P. KHAREL, C. SUDAKAR, G. LAWES, R. NAIK, Wayne State University, Detroit, R. SURYANARAYANAN, LPCES,Université Paris-Sud, France, V.M. NAIK, University of Michigan-Dearborn — Intense research for room temperature (RT) ferromagnetism (FM) in semiconductors doped with both magnetic and non-magnetic dopants is ongoing because of their potential applications in spin- & photo-electronics.We successfully employ a simple non vacuum based spin-coating technique to prepare $Zn_{1-x}Co_xO$ films (0.5 to 1μm) on Al_2O_3 (001) substrate using precursor solutions of Zn and Co-ethylhexanoate. The films were annealed in air at 700^0C/1h followed by annealing at 550^0C/1h at 10^{-5} – 10^{-6} Torr. X-ray and Raman spectrum indicate no change of wurtzite structure and no cluster formation due to the incorporation of Co in ZnO. Magnetic measurements reveal lack of RTFM in air annealed films, whereas on vacuum annealing films acquire FM ordering. Raman spectra gives a direct evidence on the influence of defect activated FM. The observed FM varies non-monotonically with cobalt concentration. Finally, the effect of annealing, role of oxygen defects, and concentration of Co^{2+} ion on the magnetization properties will be discussed.

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