Room temperature ferromagnetism in as-deposited and post-annealed Co-doped ZnO films

XIAO-HONG XU, XIAO-LI LI, Shanxi Normal University, China, G.A. GEHRING, University of Sheffield, UK — The Co-doped ZnO thin films were prepared on c-cut sapphire substrates by magnetron co-sputtering, and then annealed at various temperatures in vacuum. Magnetic measurements indicate that all the films are ferromagnetic at room temperature and the magnetization of the annealed $\text{Zn}_{0.88}\text{Co}_{0.12}\text{O}$ films is increased about one order of magnitude in comparison with the corresponding as-deposited one. Both X-ray diffraction and TEM results show that there are not any Co and Co oxides secondary phases. Optical spectrometry indicates that $\text{Co}^{2+}$ enters the tetrahedral sites of the wurtzite structure of ZnO host and substitutes for $\text{Zn}^{2+}$.

Supported by grant Nos. 10574085 and 60776008 of NSF of China, NCET-07-0527 of China and the Leverhulme Trust of UK.