

Abstract Submitted
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Correlation between ferromagnetism and film structure in Co-doped ZnO films SEBASTIAAN VAN DIJKEN, Trinity College Dublin, R. BAUERSCHMIDT, Trinity College Dublin, V. KARTHIK, Trinity College Dublin, J.M.D. COEY, Trinity College Dublin — An experimental study on reactively sputtered ZnO films with a fixed Co doping concentration of 6 percent is presented. The magnetic moment of these films is largest (about 0.7 Bohr magneton per Co) for deposition temperatures between 650 K and 800 K. The evolution of the magnetic moment with temperature correlates with an increase of the lattice parameter perpendicular to the film plane. For films on C-plane (0001) and R-cut (1-102) sapphire substrates the maximum elongation amounts to 2.5 percent and 1.3 percent, respectively. Annealing the films at 720 K for 6 hours in vacuum results in a relaxation of the lattice parameters towards the bulk values. In addition, the Co-doped films become electrically conducting during the annealing procedure. Both effects, however, do not drastically alter the magnetic moment of the Co-doped films: For films on C-plane sapphire the moment remains practically unchanged, while the magnetic moment increases only slightly for films on R-cut sapphire. These results and their implications for the understanding of ferromagnetism in Co-doped ZnO will be discussed.

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