EPITAXIAL p & n ZnO THIN FILMS GROWN BY PULSED LASER DEPOSITION

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Although diluted magnetic semiconductors (DMSs) and carrier induced ferromagnetism are attracting considerable attention because of the possibility of incorporating magnetic degrees of freedom in traditional semiconductor materials[1] the origin of magnetism in oxide mixtures is still not clear, and a clear relationship between doping and the exchange interaction is still lacking.

Since the recent theoretical prediction by Dietl *et al.*[2] of Curie temperatures above room temperature (RT FM) in ZnO and GaN containing 5% of Mn, several experimental studies have reported ferromagnetic like behaviour in these compounds[3]. Several theories exist about the mechanism responsible for ferromagnetism. In order to clarify if magnetism is due to doping, to an interfacial phenomenon, or to a surface reduction of the Co_3O_4 due to the presence of zinc oxide, epitaxial ZnO thin film and ZnO-Co_3O_4 multilayers have been grown by pulse laser deposition (PLD) and characterized structurally, electrically and optically.

While previous work of our group has been obtained polycrystalline ZnO thin films[4], recently we have obtained epitaxial ZnO films on (0001) Al_2O_3 substrates at a relatively low temperatures (300-600ºC). These films are used to correlate transport and optical properties in the absence of grain boundary effects. Results are also shown for ZnO/Co_3O_4[5,6] multilayers and compared with the properties of individual ZnO and Co_3O_4 layers.

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