

Sol gel synthesis of zinc oxide films doped with transition metals

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Abstract: Zinc oxide is a wide band gap semiconductor that finds application in varistors and piezoelectric devices.. Recent research has focussed on dissolving enough magnetic transition metal (TM) ions in the wurzite to make a ferromagnetic semiconductor. Thin films of ZnO have been prepared using a sol gel route. Zinc acetate was dissolved in ethylhexanoic acid and heated to obtain zinc ethylhexanoate. The solution was deposited on polycrystalline alumina substrates by "spin coating" successive layers. Transition metals could be dissolved readily in the zinc ethylhexanoate solutions as acetylacetonates hence ZnO films containing Co. A series of solutions were prepared to determine the solubility limit of the transition metal in the wurzite structure. The phase formation was studied using X ray diffractometry to determine the optimum crystallisation temperature and observe any second phases formed by the addition excess transition metal.