Electrical and magnetic properties of (Al, Co) co-doped ZnO films deposited by RF magnetron sputtering

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In this work, (Al, Co)-ZnO films were co-sputtered on glass substrate through radio frequency sputtering at 100 ℃. The film's structure, electrical and magnetic properties as a function of Al doping content is investigated. The results indicate that (Al, Co)-ZnO films crystallinity can be suppressed by Co doping or (Co, Al) co-doping. With the substitution of Zn^{2+} by Al^{3+}, the film's conductivity improves. All the films present ferromagnetic behavior at room temperature. With increasing Al doping amount, the film's saturation magnetization expresses a carrier-concentration dependent behavior. Three different regions can be defined, where BMP model and carrier-mediated exchange mechanisms play a role in the various regions.

Keywords: (Al, Co)-ZnO films; electronic properties; magnetic properties; RF sputtering; ferromagnetic behavior.

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