Contribution ID: **34** Type: **not specified**

Study of the incorporation of Co into zinc oxide matrix via mechanochemical grinding

Friday 2 December 2016 15:10 (20 minutes)

Zinc oxide (ZnO) has been considered a promising material for applications in Spintronics since Dietl et al. predicted ferromagnetic behavior at room temperature in this oxide doped with Mn [1]. Currently, there are many studies about the magnetic properties of doped ZnO with different transition metals, such as Co, Fe and Ni. The mechanochemical processing technique became very popular to obtain new multicomponent oxides and modify existing ones. That because it's simple implementation, solvent free, and capable of providing enough volume of material in an economically viable manner [2]. This study aimed to produce Co-doped ZnO ($Zn_{0.95}Co_{0.05}O$) nanostructured by mechanochemical grinding. The Pechini Method was used to obtain powders of the zinc and cobalt oxides. Subsequently, these oxides were ground at 400, 500 and 600 rpm in a Retsch PM 100 planetary ball mill at various grinding times. The milled samples were heat-treated at different temperatures (400, 500, 600, 700, 800 and 900℃). X-ray Diffraction and Raman Spectroscopy analysis techniques were used to study the incorporation of Co into zinc oxide matrix. The effect of grinding time in the crystallite average size was evaluated through of the powder diffraction patterns (Bragg peak broadening).

Acknowledgements:FAPEMIG, CAPES, CNPq, FINEP

References:

[1] DIETL, T. et al. Science, v. 287, p. 1019-1022, 2000.

[2] FUENTES, A. F. and TAKACS ,L. Journal of Materials Science, vol. 48, p. 598–611, 2013.

Tipo de Apresentação

Poster

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Session Classification: Poster

Track Classification: Poster