

Influence of laser line power on Raman spectra of ZnO(Co)

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The purpose of this work was to study influence of laser line power on Raman spectra of nanosized powders of ZnO doped with CoO. Attention is given to nanostructures made of ZnO due to their large expected spectra of applications such as in spintronic devices, in solar cells and flat panel displays, in electro-optical devices and in transparent ultraviolet protection films [1, 2]. Also ZnO is promising material for high temperature ferromagnetism. Nanocrystalline samples were obtained by wet chemical (concentration of CoO from 5% till 95%). Samples were characterized by X-ray diffraction (XRD) to determine composition of the samples. At all concentration of CoO only two phases were register by XRD, the ZnO phase and the Co₃O₄ phase with mean crystalline size from 14 nm to 156 nm.

Vibration properties of the system and characteristic lattice vibration frequency have been studied with Raman spectroscopy, green line 514.5 nm of argon-ion laser. Obtained Raman spectra's are analyzed and fitted with Lorentzian line for all peaks.

In all spectra, with Raman spectroscopy, we have registered both phases ZnO and Co₃O₄. For lower concentration of doped CoO, till 40%, increase of laser power improve quality of obtained spectra. In Raman spectra of all obtained samples is evident that with increase of laser power Co₃O₄ peaks becomes more intense as well as multi phonon ZnO peaks, while all other ZnO peaks are lost.

[1] Y. Chen, D.M. Bagnall, H. Koh, K. Park, K. Higara, Z. Zhu and T. Yao, J. Appl. Phys. 84, 3912 (1988).

[2] J. Nemeth, G. Rodriguez-Gattorno, A. Diaz and I. Dekany, Langmuir 20, 2855 (2004).