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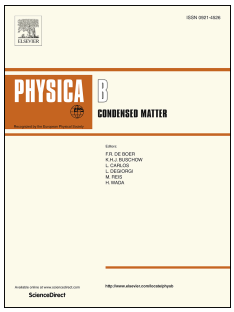

The effect of reaction temperature on the room temperature ferromagnetic property of sol-gel derived tin oxide nanocrystal

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The effect of reaction temperature on the room temperature ferromagnetic property of sol-gel derived tin oxide nanocrystal

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Abstract

In the present study, nanocrystalline tin oxide materials were prepared using sol-gel method with different reaction temperatures (25˚C, 50˚C, 75˚C & 90˚C) and the relation between the room temperature ferromagnetic property of the sample with processing temperature has been analysed. The X-ray diffraction pattern and infrared absorption spectra of the as-prepared samples confirm the purity of the samples. Transmission electron microscopy images visualize the particle size variation with respect to reaction temperature. The photoluminescence spectra of the samples demonstrate that luminescence process in materials is originated due to the electron transition mediated by defect centres. The room temperature ferromagnetic property is observed in all the samples with different amount, which was confirmed using vibrating sample magnetometer measurements. The saturation magnetisation value of the as-prepared samples is increased with increasing the reaction temperature. From the photoluminescence & magnetic measurements we accomplished that, more amount of surface defects like oxygen vacancy and tin interstitial are created due to the increase in reaction temperature and it controls the ferromagnetic property of the samples.

Key words: *Tin oxide nanocrystal, room temperature ferromagnetism, reaction temperature, vibrating sample magnetometer study*

1. Introduction:

Tin oxide nanostructures are highly interested in the field of transparent conductors [1], solid state gas sensors [2], photo catalyst [3] and so on. The surface composition of tin oxide plays a vital role in triggering these applications [4]. This compositional variation can be induced in the material due to the distribution of various kind of defects over their surface.