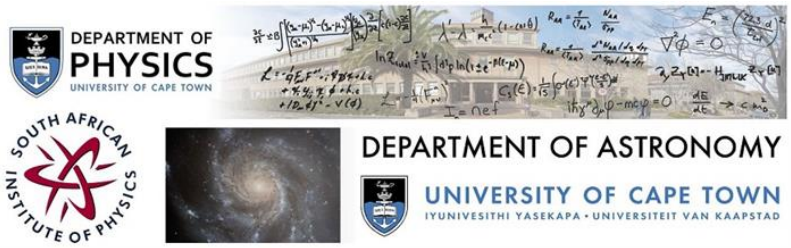
SAIP2016



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Effect of calcination on structural and magnetic properties of nickel chromite

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Abstract :

Spinel nickel chromite demonstrates ferrimagnetic ordering below T_C = 74 K, and it undergoes several temperature dependent structural and magnetic phase transitions [1]. Recently, it has shown the exchange bias effect, attributed to an anisotropic exchange interaction between the ferrimagnetic and antiferromagnetic components of magnetic moment [2]. These results motivated a detailed investigation into the high temperature structural phase transitions of this material, as well as the effect of calcination on magnetic properties, that are reported here. *In-situ* high temperature XRD studies of the as synthesized nickel chromite samples measured in air and He atmospheres suggests the phase formation takes place around 800 to 900 °C. The cubic structure of nickel chromite is retained up to almost 1100 °C, contrary to the reported tetragonal phase observed at such elevated temperature [3]. Upon cooling no change in crystal structure is observed. Nickel chromite samples calcined at 900 °C and 1100 °C, respectively, have been used for microstructural and magnetic studies. The particles are found to have a broad size distribution. T_C is obtained to be 86 K for the sample calcined at 900 °C, whereas it is reduced to 74 K for the other. The magnetic transition observed at T_S = 31 K marking the onset of ordering of antiferromagnetic component, remain unchanged for both the samples. The spontaneous magnetization values for samples calcined at 900 °C and 1100 °C are found to be lesser than reported values [1,4] and they do not show exchange bias effect.References[1] Ishibashi H, Yasumi T 2007 J. Magn. Magn. Mater 310 e610[2] Barman J et al. 2015 J. Magn. Magn. Mater. 385 93[3] Ptak M et al. 2013 J. Sol. Stat. Chem. 201 270[4] Mufti N et al. 2010 J. Phys.:Condens. Matter 22 075902

Award :

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Yes

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