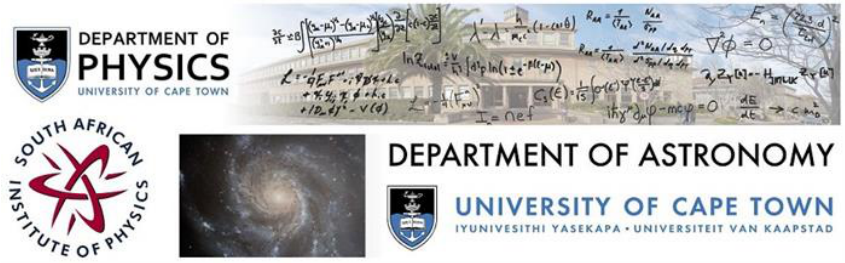

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Effect of calcination on structural and magnetic properties of nickel chromite

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Abstract content
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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 ℃. The cubic structure of nickel chromite is retained up to almost 1100 ℃, 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 ℃ and 1100 ℃, 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 ℃, 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 ℃ and 1100 ℃ are found to be lesser than reported values [1,4] and they do not show exchange bias effect.

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