Contribution ID: **137** Type: **Oral Presentation**

XRD, Mössbauer and magnetic study of MxCo1-xFe2O4 (M = Zn or Cd) nanoparticles

Tuesday, 9 July 2019 12:20 (20 minutes)

In the current work the TMxCo1-xFe2O4 (TM = Zn or Cd) nanosized compounds with average particle size of about 9 nm were synthesized and investigated by Mössbauer and magnetization measurements. The concentrations of Zn2+ or Cd2+ ions and crystallite size have significant effects on the magnetic properties. The 57Fe Mössbauer spectral studies show ordered magnetic spin state for x < 0.5 and paramagnetic phase for 0.6 < x < 1.0 compositions. This can be explained by the weakening of super exchange interactions between the 57Fe nuclei at tetrahedral (A) and octahedral (B) sites due to the increasing contents of nonmagnetic Zn or Cd atoms. The Mössbauer spectra for Zn- and Cd-based compounds are closely related due to the similar electronic configuration of Zn2+ and Cd2+ ions. The magnetization data reveal the superparamagnetic nature of the compounds investigated. An increase in coercive fields from about zero at room temperature to ˜3 kOe at 10 K due to spin freezing has been observed. The temperature dependence of magnetization show blocking temperatures higher than 300 K. The variations of the magnetic parameters such as saturation magnetization, coercive fields are discussed on the basis of Zn or Cd contents and crystallite size.

Apply to be
 considered for a student
   award (Yes / No)?

Yes

Level for award
 (Hons, MSc,
   PhD, N/A)?

MSc

Primary author: Mr MASUKU, Sizwe (University of Zululand)

Co-author: Prof. MSOMI, Justice (University of Zululand)

Presenter: Mr MASUKU, Sizwe (University of Zululand)

Session Classification: Physics of Condensed Matter and Materials

Track Classification: Track A - Physics of Condensed Matter and Materials