

Abstract Submitted  
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**Mossbauer Study of the  $x\text{Cr}_2\text{O}_3-(1-x)\alpha\text{-Fe}_2\text{O}_3$  nanoparticles system.** SEAN KRUPA, MONICA SORESCU, Duquesne University — The  $x\text{Cr}_2\text{O}_3-(1-x)\alpha\text{-Fe}_2\text{O}_3$  nanoparticles system was synthesized hydrothermally for  $x=0.0$  to  $x=0.9$ . Mössbauer spectroscopy was performed on the obtained samples as well as for samples subjected to thermal annealing at 550 C for one hour. At  $x=0.1$ , the as obtained samples began showing superparamagnetism and became completely superparamagnetic after  $x=0.4$  concentration. The percent of the sample that was superparamagnetic increased with  $\text{Cr}_2\text{O}_3$  substitution. This correlates with chromium decreasing the particle size of the powder. The thermally annealed samples appeared to have the hematite structure re-grown for concentrations  $x=0.1$  to  $x=0.4$  with the intensity of the hyperfine magnetic field decreasing with  $\text{Cr}_2\text{O}_3$  concentration. For  $x=0.5$  to  $x=0.9$ , the percent of superparamagnetic particles increased with  $\text{Cr}_2\text{O}_3$  concentration, dominating the system by  $x=0.8$ . This system is believed to have applications in gas sensing and catalysis.

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