

# Effect of temperature on the structural and microstructural evolution of core-shell type nanocomposites based on $\text{MFe}_2\text{O}_4@SiO_2$ (M= Ni, Co)

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Our study focuses on the structural, microstructural and magnetic characterization of core-shell-type composite particles based on  $\text{MFe}_2\text{O}_4@SiO_2$  [1]. These particles were obtained by a microemulsion process and come in the form of several nanoparticles of spinel ferrite  $\text{MFe}_2\text{O}_4$  (M = Ni, Co) a few nanometers in diameter coated in a porous silica ball 40 to 80 nm in diameter. On a fundamental level, we seek to understand the influence of thermal stimulation and the environment on the structural and magnetic properties of isolated nanometric objects. Technologically, these  $\text{MFe}_2\text{O}_4@SiO_2$  composites are potential candidates in the field of data storage or health, where this kind of nanostructures based on nanoparticles are used as a contrast agent in medical imaging (MRI) or as a vector of molecules active in the field of oncology. Our contribution concerns a comparative study between two nanocomposites  $\text{NiFe}_2\text{O}_4@SiO_2$  and  $\text{CoFe}_2\text{O}_4@SiO_2$ , where we present the results of the evolution of their structure and microstructure as a function of the annealing temperature. These results were obtained by X-ray diffraction, transmission electron microscopy and Mössbauer spectrometry of  $^{57}\text{Fe}$ .

## References:

[1] A. Bajorek, C. Berger, M. Dulski, M. Zubko, S. Lewińska, K. Prusik, A. Slawska-Waniewska, F. Grasset, and N. Randrianantoandro, Tuning Physical Properties of  $\text{NiFe}_2\text{O}_4$  and  $\text{NiFe}_2\text{O}_4@SiO_2$  Nanoferrites by Thermal Treatment, *Metallurgical and Materials Transactions A* (2022), 53, 1208–1230

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