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SAMPLE ABSTRACT

Materials Science

INVESTIGATION OF IRON-OXIDE NANOPARTICLES SYNTHESIZED IN POLYSTYRENE RESIN MATRIX, C. A. Grabowski[1], V. M. Naik[1], D. Rodak[2], E. Kroll[2], G. M. Tsoi[2], R. Naik*[2], L. E. Wenger[2], P. P. Vaishnava[3], R. Suryanarayanan[4], University of Michigan - Dearborn[1], Department of Natural Sciences, Dearborn, MI 48128, Wayne State University[2], Department of Physics and Astronomy, Detroit, MI 48202, Kettering University[3], Flint, MI 48504, University of Paris-Sud[4], Orasy, France, naik@physics.wayne.edu

Magnetic nanoparticles have potential applications ranging from targeted drug delivery and imaging in the medical field to sensing and memory storage in technology. The preparation, structure and physical properties of iron oxide based nanoparticles synthe-sized by ion exchange in a polystyrene resin have been investigated. By employing a syn-thesis method originally developed by Ziolo et al, nanoparticles were prepared in a sul-fonated divinyl benzene polystyrene matrix using various salt solutions of $FeCl_2$ and $FeCl_3$ as well as combinations of $FeCl_2$ and $FeCl_3$. Powder x-ray diffraction (XRD) was used to identify the different phases present and identify average particle size while Transmission Electron Microscopy (TEM) was used to determine particle morphology and particle size distribution. SQUID magnetization measurements show a super- para-magnetic behavior with blocking temperatures (T_B) varying from 20 K to room tempera-ture. This data led to the conclusion that not only does the number of reactions performed have an effect on the particle size, but the salt solution used also influences the particle size given both $FeCl_2$ and $FeCl_3$ solutions resulted in γ-Fe_2O_3 particles within the resin. The nanoparticles produced with only $FeCl_2$ were larger and have a broader particle size distribution than those prepared using $FeCl_3$.

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