Turkish Journal of Physics

Turkish Journal

of

Physics

# Physical Characteristics of Polymer Magnetic Microspheres

Rasim A. ALI-ZADE
Institute of Physics Azerbaijan National Academy of Sciences,
H. Javid. str. 33, Baku Az-1143, AZERBAIJAN
e-mail: alizade@lan.ab.az

Keywords
Authors

**Abstract:** In this study the structure and the magnetic properties of polymer microspheres, filled with magnetite nanoparticles are investigated. Average particle size of magnetite nanoparticles before and after being introduced into polymer microspheres, and the distance between nanoparticles in the polymer microspheres, are measured. Magnetization curve of polymer magnetic microspheres (PMMS) is determined. The magnetic susceptibility of PMMS with various diameters, and the dependence of PMMS magnetic susceptibility on diameter are determined. Magnetization occurs due to the orientation of PMMS as a magnetic moment. The total magnetic moment of PMMS is the sum of magnetic moments of PMMS sections which consist of magnetic moment chains of magnetite nanoparticles lined up along the diameter and lines parallel to the diameter of the PMMS sections. Analysis of results showed that magnetite nanoparticles are uniformly distributed all over the microspheres and do not aggregate during PMMS synthesis. PMMS is superparamagnetic. Analysis of the dependence of PMMS magnetic susceptibility on the diameter shows that for small diameters ($d < 300\ \mu m$), all magnetite nanoparticles in chains are lined up along the external magnetic field. That is, all magnetite nanoparticles in chains take part in the magnetization. However, for large diameters, some parts of chains in sections are transformed into clusters, this reduces the length of chains and decreases the magnetic susceptibility of PMMS.

Turk. J. Phys., **28**, (2004), 359-368.
Full text: pdf
Other articles published in the same issue: Turk. J. Phys.,vol.28,iss.6.

phys@tubitak.gov.tr

Scientific Journals Home Page