# Magnetite nanoparticles prepared by spark erosion

Mikhail Maiorov[1], Elmars Blums[1], Gunars Kronkalns[1], Aija Krumina[2], Mara Lubane[2],

[1]Institute of Physics, University of Latvia

[2] Institute of Inorganic Chemistry, Riga Technical University, Latvia

e-mail: eblums@sal.lv

Nanometer sized magnetic particles are of great interest for modern engineering and medical applications [1]. In most cases the commonly used ferrofluids contain magnetite nanoparticles because they are chemically stable and obey high magnetic properties. Ferrite nanoparticles usually are prepared by chemical coprecipitation from ferric-ferrous salt solutions. Unfortunately, for some applications these technologies are unacceptable because the prepared nanodispersions may contain various uncontrollable chemical side products.

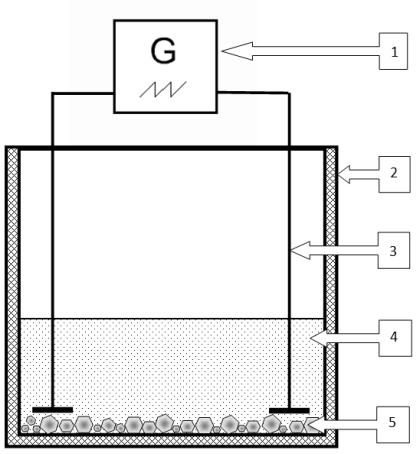


Fig.1 Spark erosion set. 1 – spark generator, 2 – glass vessel, 3 – electrode, 4 – water, 5 – spark eroded metallic particles.

In this paper, we study the possibility of obtaining magnetite nanoparticles without use of chemicals. Particles are prepared by initiation of high frequency electric discharge between the coarse particles of iron powder under a layer of distilled water (Fig. 1). This results in the vaporization of the metal and subsequent vapor condensation in the form of nanoparticles (Svedberg method). Due to chemical interaction with water at high temperatures the condensation end product is ferric oxide. The particles are transferred in hydrocarbons and peptized with employing oleic acid as a surfactant. On basis of vide range of measurements it is shown that the nanoparticles consist of magnetite (measurements with XRD, TEM, DLS, VSM) and their particle size lies in the interval of 6 – 12 nm.

References

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