9.7 cm

Study of physical and ultrasonic properties of physiological solution magnetic fluid

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Physiological solution based magnetic fluid was studied regarding to particle size of magnetite (by means of Atomic Force Microscopy (AFM), Transmission Electron Microscopy (TEM) and Vibrating Sample Magnetometer (VSM)) and colloidal stability (with the aid of magnetorheology and ultrasonic measurements). From the results obtained by above mentioned methods is clear that mean particle diameter values D_v and standard deviation values σ are as follows: $D_{v/AFM}(7.6nm) < D_{v/VSM}(9.3nm) < D_{v/TEM}(10.6nm)$ and $\sigma_{AFM}(0.39nm) > \sigma_{VSM}(0.29nm) > \sigma_{TEM}(0.22nm)$. The mean particle diameter, $D_{v/AFM}$, obtained from the AFM data is 1.39 x smaller than that obtained from the TEM data, $D_{v/TEM}$. This difference can be explained by the difference in the method of sample preparation for AFM and TEM experiments. The smaller mean particle diameter observed in VSM data in comparison with the value obtained from TEM data can be explained by the presence of surface nonmagnetic layer around magnetite particles. Results from magnetorheology and ultrasonic measurements in external magnetic field confirmed good colloidal stability of sample: no aggregates are seen.

13.4 cm

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