



Study of the Ferrofluid Drying Process for Morphological and Nanostructural Characterization

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A drying method suitable for the study of the morphological and structural properties of colloidal magnetic systems, including a contrast agent used in Magnetic Resonance Imaging (MRI) is described. We tested three alternative ferrofluid drying methods: drying at $70\pm C$ in nitrogen atmosphere; drying in air at $70\pm C$; and drying by lyophilization using an MRI marker in the form of a colloidal suspension (EndoremTM - Guebert). X-ray diffraction (XRD), and transmission electron microscopy (TEM) were applied to each characterization method.

The XRD allowed the observation of the possible physical-chemical changes of the stabilizers and also Fe_3O_4 present in the system. The morphology and nanoparticles size distribution was analyzed by TEM. Among the drying methods examined in this study, the lyophilization has shown to be the more adequate one for the nanoparticles (Fe_3O_4) morphological study and nanostructural characterization, because the structure of the nanoparticles was maintained the same as in the suspension. The drying procedures performed at $70 \pm C$ in the atmosphere of nitrogen and air led to the coalescence and growth of the nanoparticles, as well as some

degradation has been noticed in some of the stabilizers.

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