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MAGNETIC COMPOSITE FILMS BASED ON ALGINATE AND NANO-IRON OXIDE PARTICLES OBTAINED BY SYNTHESIS "IN SITU"

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ABSTRACT

In this work, sodium alginate was used as the polymeric matrix of magnetic nanocomposite films where iron oxide particles, in percentages varying from 2 to 10 wt.% (respect to alginate content), were synthesized "in situ". The effects of the nanoparticle concentration and the addition of 30 wt.% of glycerol as plasticizer on the properties of the composite films were analyzed by X-ray diffraction, scanning electron microscopy, infrared spectroscopy, tensile tests, zero field cooling/field cooling measurements and isothermal magnetization as function of applied fields at different temperatures. The presence of residual salts formed during the synthesis process, the film microstructure and the interactions developed between magnetic particles and between particles and matrix were the most important factors that affected the film properties. All the synthesized composite films showed super paramagnetic behavior, while the recorded blocking and irreversibility temperatures were lower for the plasticized ones, indicating that the size of the magnetic particles/particle agglomerates formed in these samples was smaller and the particle dispersion in the polymeric matrix better than those obtained in films prepared without glycerol.

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