Magnetic Properties of Fe_3O_4 Nanoparticle Encapsulated with Poly(D,L Laticde-co-Glycolide)

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Recently, magnetic nanoparticles of iron oxides have been evaluated as a MRI contrast agent, especially for liver and spleen. [1] However, relatively high toxicity of magnetic nanoparticles restricts the use of these materials to human beings. Therefore, much of attention has been focused on the encapsulation of magnetic nanoparticles with polyesters such as PLGA, poly(D,L lactide) (PLA), and poly(glycolide) (PGA), because they have biocompatible and biodegradable properties as well as low toxicity. In this study, we report the preparation of magnetic nanoparticles of Fe_3O_4 encapsulated with PLGA by an emulsification-diffusion technique. Especially, the optimal parameters for nanocapsulation, such as homogenizer and agitator speed, and the magnetic properties of nanoparticles encapsulated with PLGA with varying the nanoparticle size from 10 nm to 180 nm were investigated. Fig. 1 shows the magnetic hysteresis loops with varying the size of the encapsulated nanopaticles. It revealed that as the size of the encapsulated nanoparticles decreased, magnetization and magnetic susceptibility increased. It could be ascribed that the volume fraction of embedded ferromagnetic particles to PLGA matrix is increased as the size of encapsulated nanoparticles decreased. In this work, the effects of nanocapsulation with poly(D,L lactide) on the magnetic properties of nanoparticles will be discussed.

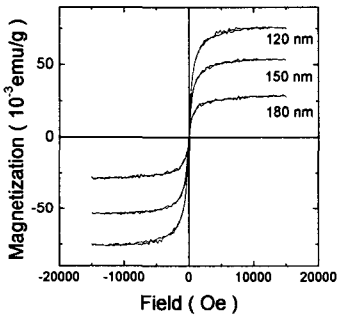

Fig. 1. Magnetic hysteresis loops with varying the size of encapsulated Fe_3O_4 nanoparticles.

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References

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