

Preparation and Characterization of Magnetic Fluids with Different Photosensitizers for Photodynamic Therapy

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Based on their unique mesoscopic physical, tribological, thermal, and mechanical properties, superparamagnetic nanoparticles offer a high potential for several applications in different areas such as ferrofluids, color imaging, magnetic refrigeration, detoxification of biological fluids and magnetic cell separation [1,2].

Ferrimagnetic particles of Fe₃O₄ were nanometrically synthesized by coprecipitation method. In order to treat tumors in body, hematoporphyrin(HP) and 5-aminolevulinic acid(ALA) were used as a photosensitizer, which were coated on magnetic particles of Fe₃O₄. The coated magnetic particles can be localized at the tumor by magnetic field. Therefore, the drug is highly concentrated on an affected part while keeping low dosage. In order to coat photosensitizer on to the particles, 1×10^{-3} mol of HP and 2×10^{-3} mol of ALA were introduced into the fluid solution after coprecipitating the mixed solution of FeCl₂·4H₂O and FeCl₃·6H₂O, respectively. The concentration of each coated-photosensitizer were quantitatively measured by UV-spectroscopy and amino acid analyzer. And, tumor cell line(SNU-878) was applied to confirm the PDT effect of each photosensitizer-coated magnetic fluids. The change of ΔT was then investigated in CO₂ incubator for 24h.

[1] J.P. Smith, S.M. Levy, and F.P. Tang, J. Phys.: Condens. Matter 12, 5346 (2001)

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