

Effect of photosensitizer-coated magnetic fluids for photodynamic therapy;
cytotoxicity assay

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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].

Superparamagnetic 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. Decanoic acid and nonanoic acid as a 1st and 2nd surfactants were used, and the only 1-step surfactant was required by the direct coating on particles in the case of ALA. Analyses of UV-spectrometer and pico-tag amino acid were used to estimate the each coating efficiency of HP and ALA quantitatively. As a results, the coating efficiency of HP and ALA was 2.0% and 12.5% respectively. And their toxicity of each fluid was estimated using Sprague-Dawley rats.

Also, A549 human lung cancer cell line was applied to confirm the photodynamic therapy effect of each photosensitizer-coated magnetic fluids. Subculture was performed with the dissociation medium. After dissociation of the cells, 1*10⁵ cells were seeded into 60-mm dish containing 5ml of culture medium. The photodynamic therapy experiments were performed for the light doses with 0, 50, 200 and 400mJ/cm².

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

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