Preparation of manganese phthalocyanine nanoparticles by laser ablation in liquid and application to contrast agents for photoacoustic imaging

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Photoacoustic imaging is one of the most promising techniques to investigate the inside of the living body. The advantages are noninvasive observation of the deep area of the body and tissue, and high resolution and contrast of bioimaging. [1,2] The irradiation on materials with pulsed light generates ultrasonic waves, and the image of the target position can be obtained by detecting the emitted ultrasonic waves. It is necessary to apply a contrast agent to amplify the photoacoustic signal to distinguish normal cells from tumor cells. The contrast agent should be able to absorb light in the range of 600-1100 nm because in this range the light absorbance of the living body is very low.[3] The absorbance of manganese phthalocyanine is suitable as a contrast agent. Due to the EPR effect, nanoparticles smaller than 200nm are suited to be a contrast agent. [4]

Nanoparticles of Manganese phthalocyanine (MnPc) were prepared by laser-ablation in liquid. Powder of MnPc was dispersed in DI water by sonification for 10 minutes to get the suspension, which was then irradiated by Nd:YAG laser (second-harmonic generation, wavelength 532 nm, pulse duration 13 ns, repetition rate10 Hz). The morphology was measured by Scanning Electron Microscope (SEM) and Dynamic Light Scattering (DLS). The absorbance was measured by Ultraviolet-visible spectroscopy (UV-Vis). The dispersion stability was measured by zeta potential.

MnPc nanoparticles were successfully prepared by laser ablation in liquid. The shape was mostly polygonal and partially spherical. The increase in laser fluence reduced primary and secondary particle sizes. Absorbance was increased at low laser fluence and decreased at high laser fluence. With the increase of fluence, the photoacoustic signal was increased at low laser fluence and decreased at high laser fluence.

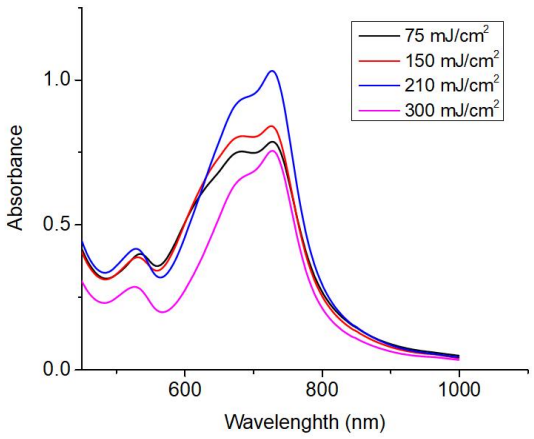

Figure 1. UV-vis spectrum of MnPc of irradiation time 30 min, fluence at 75, 150, 210, 300 mJ/cm², concentration 100 ug/ml

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