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Editorial on Photodynamic Therapy of Upconversion Nanoparticles Prepared by Laser Ablation in Liquid

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In recent years, extensive research on nanoparticles has been conducted due to their unique physical properties and potential applications. Many nanoparticles preparation techniques such as precipitation method exist. One of unique methods is 'laser ablation in liquid,' which creates nanoparticles by the irradiation of focused pulse laser to a target in liquid. The prepared nanoparticles are highly crystalline. Multi- element nanoparticles are easily prepared by this method. One of attractive nanoparticles is upconversion one. Upconversion nanoparticles emit visible light by an excitation of near-infrared (IR) light. Study on solar cell showed increase in the conversion efficiency by wavelength conversion of light from IR to visible region. Study on cancer treatment using photodynamic therapy (PDT) indicated that irradiation of near-IR light to cancer cells solved the problems. In this talk, preparation of upconversion nanoparticles and application in biomedical fields related to our studies were reviewed. Upconversion nanoparticles were prepared by laser ablation in liquid. Target Y2O3: Er, Yb was prepared by co-precipitation method. Laser was Nd: YAG/SHG. Prepared nanoparticles were investigated by XRD, SEM, STEM and DLS. Optical properties were measured by fluorospectrometer. In-vitro experiments using cancer cells were performed to examine the effect of PDT. XRD patterns showed highly crystalline Y2O3: Er, Yb nanoparticles without by- products were prepared by this method. SEM images indicated that coarse and fine nanoparticles were prepared at the same time. Upconversion spectra showed that typical red and green emission of Er3+ was observed at an excitation of near-IR light.Cancer cells were killed irradiation of near-IR to upconversion nanoparticles and photosensitizer.