

## Influence of Solvents on Characteristics of Nanoparticles Prepared by Pulsed Laser Ablation on Iron Target\*

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### ABSTRACT

*An iron target submerged in three different solvents (distilled water, absolute ethanol and acetone) was laser ablated to study the influence of solvents on the size and composition of the nanoparticles produced. A Nd:YAG laser ablation machine was operated at wavelength 1064 nm, pulse power 90 W, pulse frequency 30 kHz and pulse duration 3 ns. Nanoparticles were characterized by UV-Vis spectroscopy and transmission electron microscopy (TEM). TEM revealed that spherical nanoparticles, mainly FeO, were observed in all solvents. Fe<sub>2</sub>O<sub>3</sub> was found only in distilled water. Well-dispersed nanoparticles with mono-modal distribution and a mean particle size of ca. 20 nm were produced only in the acetone. It is believed that higher dipole moment of the solvents should lead to an inhibition of growth or aggregation of nanoparticles, and hence the smallest nanoparticles were observed with the acetone.*

**Keywords:** Laser ablation, Iron, Nanoparticles, Acetone, Ethanol, Water

### INTRODUCTION

Nanoparticles, in the form of nanopowders or colloids, can be synthesized by laser ablating a solid target that lies in a gaseous or a liquid environment (Arul et al., 1998). The size, composition and crystal structure of the produced nanoparticles are influenced by parameters of laser ablation in liquids, including types of liquid media. It has been known that micrometer size of round and multi-twinned crystalline particles of copper and copper oxide can be produced in water, acetone and decane from metal or metal oxide targets by Nd:YAG laser (532-1064 nm wavelength) (Tilaki et al., 2007a; Amikura et al., 2008). Thraeja and co-workers (2007) reported that adding of isopropanol into water has an

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