

Laser ablation synthesis and optical properties of copper nanoparticles

ABSTRACT

Copper nanoparticles (Cu-NPs) were prepared in virgin coconut oil (VCO) using a laser ablation technique. A copper plate immersed in VCO was irradiated by an Nd:YAG laser at wave lengths of 532 nm for 5, 10, 20, and 30 min. By increasing the ablation time from 5 to 30 min, the particle size inside the nanofluid decreased from 11 to 4 nm and the concentration, refractive index, and the volume fraction of copper nanofluid increased. The Cu-NPs were capped with oxygen from hydroxyl groups of the VCO, as verified by Fourier transform infrared spectroscopy. The refractive indices, obtained by analysis of the surface plasmon resonance signals increased from $1.44371 + 0.0034i$ to $1.44387 + 0.0142i$, and special self-phase modulation due to nonlinearity effect was investigated.

Keyword: Copper nanoparticles; Laser ablation; Virgin coconut oil (VCO)