INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student	:	Prahlad Kumar Baruah
Roll Number	:	126121027
Programme of Study	:	Ph.D.

Thesis Title: Elucidation of Surface Plasmon Resonance, Size and Structure of $Cu@Cu_xO$ and $Ag@Ag_xO_y$ Nanoparticles Synthesized by Pulsed Laser Ablation in Liquid, Dynamics of the Process and Applications

Name of Thesis Supervisor(s)	:	Prof. Alika Khare and Dr. Ashwini Kumar Sharma
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SHORT ABSTRACT

In the present thesis, nanoparticles of copper and silver have been synthesized by pulsed laser ablation of the respective targets in distilled water. The surface plasmon resonance, size and the structure of the nanoparticles have been simultaneously controlled by the laser ablation duration, incident laser energy and the background liquid viz., distilled water and two organic solvents, methanol and 2-propanol. In addition, the intriguing dynamics of the process of pulsed laser ablation in liquid is studied via shadowgraphy and beam deflection techniques. The dynamics of the cavitation bubbles and also the shock waves generated during the process exhibited the extreme condition of pressure ~ 10^{10} Pa and temperature ~ 3000 K. An attempt to correlate the dynamical behavior of the shock waves to understand the nucleation of nanoparticles is also undertaken in the reported work. The synthesized nanoparticles of copper and silver have been successfully tested to be an excellent surface enhanced Raman scattering substrate for a bioactive furanoflavonoid, karanjin, having medicinal properties. The surface enhanced Raman scattering intensity is found to be dependent on the particle size, concentration, aggregation and also on the degree of oxidation of the nanoparticles. The antibacterial properties of the nanoparticles have been used to act as a protective coating for three locally available natural silks viz., Pat, Eri and Muga which have commercial importance. The bactericidal efficacy of the nanoparticles has also been used in the treatment of filter paper for the annihilation of bacteria in contaminated water.