Master's Thesis Defense

Electro-Optics and Photonics

Tuesday, April 30,2019

11:00 AM SC 062

All are welcome to attend.

Nanoparticles Manipulation with a Laser-induced Surface Bubble and Its Application

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Abstract

In this study, we demonstrated nanoparticle manipulation and its application in advanced nanofabrication and chemical sensing by using a laser-induced surface bubble. The laser-induced surface bubble is generated on a gold-coated glass substrate by focusing a continuous-wave (CW) laser on a solid-liquid interface. Once a surface bubble is generated on the solid-liquid interface, a strong convective flow is induced in the liquid solution, which can be used to fabricate ring-shaped disk structures for chemical sensing. The size and position of the surface bubble can be dynamically adjusted by changing the power and position of the laser spots. We studied this surface bubble based on nanofabrication by investigating different fabrication parameters, such as laser power, laser exposure time, and laser chopping frequency. The possibility of multiple-layer nanofabrication is also investigated by fabricating gold and silver nanoparticles in a layer-upon-layer manner. The final fabricated ring-shaped nanostructures are used as a chemical sensing mechanism for the detection of Rhodamine 6G. The nanoparticle manipulation method based on the laser-induced surface bubble opens a new possibility of advanced nanofabrication and chemical sensing.

Keywords: Laser-induced surface bubble, nanoparticle manipulation.