

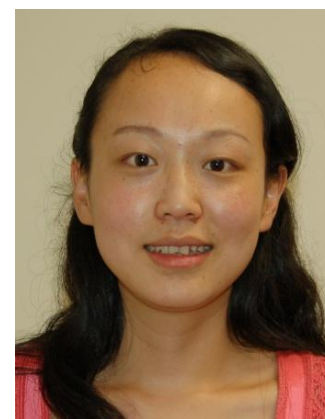
Fabrication of nanobowl structure and its plasmonic properties

By

Ms. Ma Yun

Nanyang Technological University

Date: Tuesday, 29th September 2009
Time: 3.00pm to 4.00pm
Venue: Hilbert Space (PAP-02-02)
Host: Asst. Prof. Yu Ting



Abstract:

Plasmonics is a rapidly emerging subdiscipline of nanophotonics that studies the interaction between the light and metal particles at the nanometer scale, based on the properties of both bounded/localized and radiative/propagating surface plasmon. Its deep penetration into multidisciplinary subjects makes its application widely range from surface enhanced Raman spectroscopy (SERS) for biomolecule and biological agents identification, detection and sensing, near-field optics and tip-enhanced Raman spectroscopy to electromagnetic propagation with metal-based plasmonic waveguides.

We used pulsed laser deposition technique combined with nanosphere lithography method to fabricate the metal nanobowl structure. Such method is able to accurately control several key parameters that can tune plasmonic properties of the nanobowl structure. These parameters include material species, bowl size, bowl wall thickness as well as interspacing between nearest nanobowls. The flexibility and advances of the fabrication method provide us the chance to systematically study plasmonic properties of nanobowl structure.

Au and Ag are the major material species in our study. Both of them exhibited the SERS capability to detect molecules with the low concentration (1 μ M/L in molarity), such as rhodamine 6G, crystal violet, methylene blue and brilliant cresyl blue. The plasmonic properties of metal nanobowl structures, including the dependence of electromagnetic enhancement orientation on the incident laser polarization, bowl size and wall thickness effects, were investigated experimentally and numerically. These results show that metal nanobowl structure has the potential in the applications of both sensing and waveguiding.

College of Science

Nanyang Technological University

SPMS-04-01, 21 Nanyang link, Singapore 637371

Fax: +65 6515 8229 Tel: +65 6513 8459