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Advanced Nanotechnologies and Microtechnologies

INVITATION

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Room No. U4, building A5
Faculty of Mechanical
Engineering
BUT
Technická 2, Brno

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Probing Plasmon Resonances in Noble Metallic Nanostructures Using Monochromated Electron Energy-Loss Spectroscopy

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ABSTRACT

The plasmon resonances of metallic nanostructures have received considerable attention of late owing to their wide range of applications from medicine to energy. In this talk, I will describe the use of aberration-corrected transmission electron microscopy (TEM) imaging, scanning TEM imaging and monochromated electron energy-loss spectroscopy techniques to study plasmon resonances in noble metallic nanostructures fabricated using both top-down and bottom-up techniques. The ability to control the orientations and separations of electron beam lithographically-patterned nanostructures allows us to systematically examine the changes in plasmon modes as a function of structure configuration.

Plasmon modes in silver nanoparticles can be influenced by changes in nanoparticle geometry and arrangement. As the diameter of these particles decreases from 20 nm to less than 2 nm, the resonance exhibits a 0.5 eV blue-shift, with particles smaller than 10 nm showing a substantial deviation from classical predictions.

We used the electron beam in (S)TEM to manipulate pairs of silver nanoparticles and simultaneously employed EELS to observe the plasmonic properties of the nanoparticles before and after contact. These experimental findings are supported by simulations and analytical modeling techniques.

References:

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