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Standard Surface Plasmon Modes of Nano Torus Monomer and Dimmer With Different Morphologies

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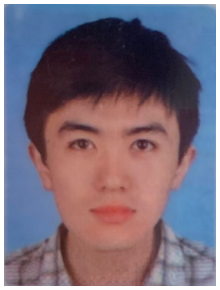
EXTENDED ABSTRACT: Plasmon deals with light confinement at the nanoscale, this is achieved by binding light to coherent electron oscillations at the surfaces of metallic nanoparticles, the so-called surface plasmons, or surface plasmon polaritons (SPP). And it can be viewed as the resonance of electrons under external electromagnetic field as the intrinsic properties of the particles. We theoretically studied the optical properties of Ag nanoparticles (NPs) with different morphologies by measuring the electron energy loss spectra (EELS) of different localized surface plasmon (LSP) resonance modes with the boundary element method (BEM). And we use the group theory to explain qualitatively how LSP modes and the corresponding degeneracies evolve as the curvature changes by classifying them based on irreducible (IR) representations, and link it with the change of EELS and EELS maps. Besides, we construct a nanodimer with nano torus monomers and discuss some interesting coupling phenomena cause by the deviations of the principal axis in symmetry group compared with monomer cases and investigate the symmetry breaking in this process. Then we show that LSP modes in both monomers and dimers are high refractive sensitive (RIS) when we change the dielectric around NPs.

Keywords： localized surface plasmon; group theory; electron energy loss spectrum; boundary element method;



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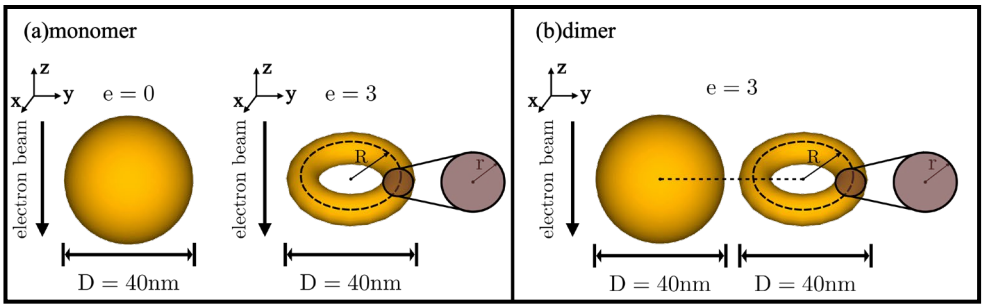

Figure 1. Configurations of NPs with different curvatures. (a) in the monomeric case and (b) in the dimeric case

REFERENCES

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BIOGRAPHY

Guangyi Liang has completed his bachelor degree at the age of 22 years in 2021 from SUN YET-SEN University and now is a Ph.D. student in Dr. Ding's group. His main research direction is plasmons in nano scale.

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