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Modeling of Core-Shell Nanoparticles for Application in the Domain of Communication

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Abstract—*Metal nanoparticles (gold or silver) excited by optical radiation, produce an intense absorption, attributed to the collective oscillation of electrons on the particle surface, termed as Plasmon Resonance. The resonant frequency is highly dependent on particle size, shape, material and environment where it is embedded. By altering these physical parameters, the resonant frequency can be shifted over a wide range of wavelengths, which makes nanoparticles very attractive as functional materials for application in the field of communication.*

In the present work, we have modelled metal-semiconductor, metal-polymer and metal-metal oxide core-shell nanoparticles and the simulation has been done by using COMSOL Multiphysics software and Mie Plot software to study its optical response for application as nano antenna at optical domain. It is found from the present study that, for same core-shell size ratio and host matrix, compared to metal-semiconductor and metal-polymer, the Surface Plasmon Resonance for metal-metal oxide core-shell nanoparticles can be obtained at higher wavelengths. This makes metal-metal oxide core – shell nanoparticles a more potential candidate for application as nanoantenna at optical frequency domain.