

Radiation by molecules near metallic surfaces: a model for molecular fluorescence

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Abstract

In this work we present a model for calculating the power radiated by an excited molecule close to metallic objects of spherical or cylindrical shapes. For the case of a molecule near metallic surfaces, we represent it as an oscillating dipole which couples electromagnetically to multipolar moments induced over the corresponding surfaces, and use a formalism similar to that previously developed by the authors for studying SERS. For the interaction of the molecule with a metallic cylinder, the electromagnetic coupling is solved using Green functions. By calculating the local field acting upon the molecule we find signal enhancements of over five orders of magnitude in the radiated power with respect to the radiation of an isolated molecule.