**Metal-Insulator-Metal thin film stack: avoided crossing between stack modes giving rise to an output photon flux enhancement**

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**Abstract**

This theoretical study presents the dispersion of surface plasmon polariton (SPP) and wave guide (WG) modes of a metal-insulator-metal (MIM) thin film stack following a photon or an electron excitation. In the present study [1], a continuation of a joint experimental-theoretical work [2], we investigate the photon reflectance and the transmitted flux of a local excitation of asymmetric MIMthin film stacks respectively glass-Ti-Au-SiO2-Au-air and air-Au-SiO2-Au-Ti-glass. One obtains the infrared and visible spectral region dispersion for a wide range of SiO2 and gold thicknesses, dSiO2 and dAu. Between 1.4 and 2.0 eV in the emission direction of the in-plane wave vector kx/k0~1.05 and for a thicknesses of SiO2 and Au of 300-700 nm and 15-40 nm respectively, the transmitted flux intensity is enhanced 12 or 25 times relative to the reference stacks of air-Au-glass and air-SiO2-glass. This enhancement is attributed to the coupling, through the avoided crossings, of the SPPair and WG modes. As the fields of the SPPair and WG modes are located in different regions of space the enhancement is nearly independent of the number of nodes in the WG mode which rises with the SiO2 thickness. In summary we have identified sets of parameters giving rise to the observables enhancement in a MIM thin film stack. In the presentation it will be also shown that this MIM thin film stack can be used to perform light polarization conversion. The present MIM thin film stack is a simple and a versatile system for the use in applications where a light enhancement or light polarization conversion are needed.

***Keywords:*** *Plasmonics, MIM thin film stacks*

**References**

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**Biography**

Georges Raseev received his master of science in chemical physics from the university of Bucharest, Romania, PhD degree in quantum chemistry from university of Louvain, Belgium. Present position at Institut de Sciences Moléculaires d'Orsay, university of Paris-Saclay France.

Research interests: Theoretical modeling of the resonances in photoionization of molecules in gas phase, of molecules oriented in space and of molecular adsorbates on metallic surfaces. Dynamics of the vibration of molecular adsorbates on stepped metallic surfaces. Photoelectric effect and laser-matter interaction at interfaces and optics of the thin film stacks using classical Maxwell equations. Optics of surface plasmon polaritons and wave-guide modes on the multilayer thin film stacks insulator-metal-insulator and metal-insulator-metal.