RICARDO TELLEZ 'Integrated plasmonic structures as sensing devices'

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Seminar, September 1, 2014, 12:00. Seminar Room

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Localized Surface Plasmons (LSP) are electromagnetic modes associated to the collective oscillations of the conductive electrons at the boundaries of metallic nanoparticles. Since these resonances are highly dependent on the geometry of the particles and refractive index of the surrounding medium, they have been studied due to their unusual optical properties

and their potential applications in optical nano-sensing devices.

In recent years it has been demonstrated that under certain conditions a chain of metallic nanoparticles (MNP) can be used as a plasmonic waveguide due to the near-field coupling between them. However, the large majority of the analysis of the modes supported by the MNP has been done above the light-line in the dispersion relations, where the modes can be only excited by illuminating the MNP from the free-space or from the substrate.

In order to study the modes excitation below the light-line limit, in this work is presented the theoretical and experimental analysis of a chain of metallic nano-wires (MNW) placed on top of a dielectric waveguide under TM polarization. It is observed that MNW of small aspect ratio support the propagation of a dipolar longitudinal mode, while those of large aspect ratio support a quadrupolar and a dipolar transversal mode.

To observe the influence of the shape of the MNP on the modes resonances, it is also studied a chain of metallic nano-cones (MNC). For this case it is found that the dipolar transversal mode enhances the field confinement on the apex of the nano-cones, representing an advantage for sensing applications.

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Hosted by Prof. Juan P. Torres