Multiwavelength plasmon mediated surface functionalization

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Plasmon-driven surface functionalization of nanoparticles is receiving growing attention as it allows generating locally tailored chemical reactivity on the nanoparticle surface [1-3]. The extension to surface multi-functionalization still represents a major breakthrough in chemistry [4]. In this talk, we address this issue by triggering regiospecific surface double-functionalization under plasmon excitation, using diazonium salts as surface functionalization agents. Lithographic gold nano-triangles, displaying multipolar plasmon modes, were selected to pattern the surface by two different types of functional poly(aryl) layers, bearing either carboxyl or hydroxyethyl pendant groups. This double- functionalization strategy is triggered by the wavelength of the incident light, matching the dipolar and quadrupolar plasmon modes respectively, leading to a site-selective hot-electrons mediated reduction of aryl diazonium salts. The grafting occurs specifically in the regions of maximum of field enhancement, leaving the other areas of the nanostructure~~'s surface~~ chemically passive. We believe that this plasmonic-based approach will not only pave a new way for the multi-functionalization of plasmonic nanoparticles but also provide a general strategy to attach molecules to hot spot regions and further improve their SERS detection and analysis for (bio) sensing applications.

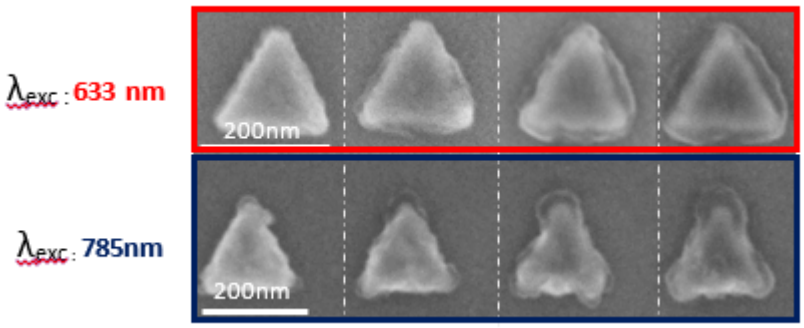

Figure 1. SEM images of gold triangles after a plasmon-mediated aryl film grafting. Grafting mostly on the sides of the structures (top); grafting mostly on the apices of the structures (bottom).

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