

Plasmon induced electrografting of Pi-conjugated materials

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Diazonium salts of various Pi-conjugated systems can be easily grafted on surface by electrochemical reduction. This process leads to the deposition of covalently grafted ultrathin films and is usually not triggered by light unless a photosensitizer is added to the solution.

In the last two years, we have developed an original way to trigger this reaction by light by using plasmon induced electrografting. Briefly when gold Nanoparticles (Nps) are illuminated, localized surface plasmons are generated and their decay can yield to the injection of hot electrons into molecules adsorbed on the NPs. When diazonium salts are close to the NP, plasmon induced diazonium salt reduction occurs and pi-conjugated material can be easily deposited locally of the gold NPs. [1,2]

In this communication, we will show how this process can be confined in between two nanoparticles separated by 30 nm gap and how the size of the nanoparticles affects the thicknesses of the grafted layers. Moreover we will show that these thicknesses depends on the pi-conjugated material grafted on the NPs

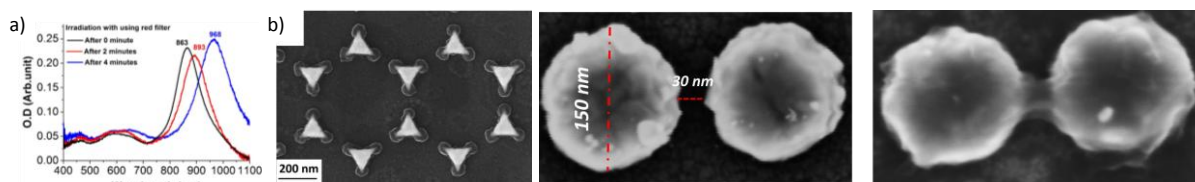


Figure : a) Extinction spectra of Au-triangle NPs after different illumination times in BTB diazonium solution. b) SEM image of Au-triangles after 4 min. illumination showing nanolocalized BTB deposition, center: initial dimer right; Modified dimer after plasmon induced anisotropic growth of BTB in the 30 nm nanogap. Growth is preferentially localized between the AuNPs Isotropic growth is observed around isolated spherical Nps

Références

[1] **Plasmon-Induced Nanolocalized Reduction of Diazonium Salts** VQ Nguyen, Y Ai, P Martin, JC Lacroix *ACS Omega*, **2017**, 2 (5), 1947-1955

[2] **Multi-functionalization of lithographically designed gold nanodisks by plasmon-mediated reduction of aryl diazonium salts** Tijunelyte, I., Kherbouche, I., Gam-Derouich, S., Nguyen, M., Lidgi-Guigui, N., de la Chapelle, M. L., ... Mangeney, C. and Felidj N. *Nanoscale Horizons*, **2018**, 3(1), 53-57.