

## Development of New Localized Surface Plasmon Resonance Interfaces Based on ITO Au NPs/ Polymer for Nickel Detection

**Authors :** F. Z. Tighilt, N. Belhaneche-Bensemra, S. Belhousse, S. Sam, K. Lasmi, N. Gabouze

**Abstract :** Recently, the gold nanoparticles (Au NPs) became an active multidisciplinary research topic. First, Au thin films fabricated by alkylthiol-functionalized Au NPs were found to have vapor sensitive conductivities, they were hence widely investigated as electrical chemiresistors for sensing different vapor analytes and even organic molecules in aqueous solutions. Second, Au thin films were demonstrated to have special localized surface plasmon resonances (LSPR), so that highly ordered 2D Au superlattices showed strong collective LSPR bands due to the near-field coupling of adjacent nanoparticles and were employed to detect biomolecular binding. Particularly when alkylthiol ligands were replaced by thiol-terminated polymers, the resulting polymer-modified Au NPs could be readily assembled into 2D nanostructures on solid substrates. Monolayers of polystyrene-coated Au NPs showed typical dipolar near-field interparticle plasmon coupling of LSPR. Such polymer-modified Au nanoparticle films have an advantage that the polymer thickness can be feasibly controlled by changing the polymer molecular weight. In this article, the effect of tin-doped indium oxide (ITO) coatings on the plasmonic properties of ITO interfaces modified with gold nanostructures (Au NSs) is investigated. The interest in developing ITO overlayers is multiple. The presence of a conducting ITO overlayer creates a LSPR-active interface, which can serve simultaneously as a working electrode in an electro-chemical setup. The surface of ITO/ Au NPs contains hydroxyl groups that can be used to link functional groups to the interface. Here the covalent linking of nickel /Au NSs/ITO hybrid LSPR platforms will be presented.

**Keywords :** conducting polymer, metal nanoparticles (NPs), LSPR, poly (3-(pyrrolyl)-carboxylic acid), polypyrrole

**Conference Title :** ICPAM 2014 : International Conference on Physics of Advanced Materials

**Conference Location :** Venice, Italy

**Conference Dates :** November 13-14, 2014