

IMMOBILIZATION OF A LASER-DYE ON GOLD NANOPARTICLES. ANALYTICAL APPLICATIONS

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In the recent years, the synthesis, characterization and exploitation of noble metal nanoparticles have become a very active research field. Gold nanoparticles exhibit optical properties different from those of metal ions in solution. These nanoparticles may be easily functionalized in order to interact with chemical species of analytical concern, such as amino acids or amines [1,2].

Gold nanoparticles are conventionally functionalized by exploiting the high affinity between sulphur and gold atoms. So, mercapto-compounds are commonly used to provide gold nanoparticles with carboxylic (e.g. mercaptoundecanoic acid) or amine (e.g. cysteamine) moieties, among others. However, there are compounds, like cyanide, that also exhibit a high affinity against gold. In this work, we took advantage from this to study the binding of a cyane-containing laser fluorescent dye (4-(Dicyanemethylene)-2-methyl-6-[p-(dimethylamine)styryl]-4H-piran, DCM) on gold nanoparticles (DCM-GNPs).

The interaction between the dye and the gold nanoparticles was studied using several analytical techniques, such as Visible-UV Spectrometry, Fluorescence Spectrometry, Infrared Spectrometry, Nuclear Magnetic Resonance and X-ray Photoelectron Spectrometry that provided interesting information about that interaction.

Experimental conditions for the displacement of DCM from the DCM-GNPs surface by cyanide ions were studied. In Figure 1, the spectral changes upon cyanide additions to a solution containing DCM-GNPs are observed. The potential application of the approach for cyanide determination is outlined.

References:

- [1] Du B., Li Z., Cheng Y., Talanta **75** (4) (2008) 959-964.
- [2] Daniel M.C., Astruc D., Chem. Rec **104** (2004) 293-346.

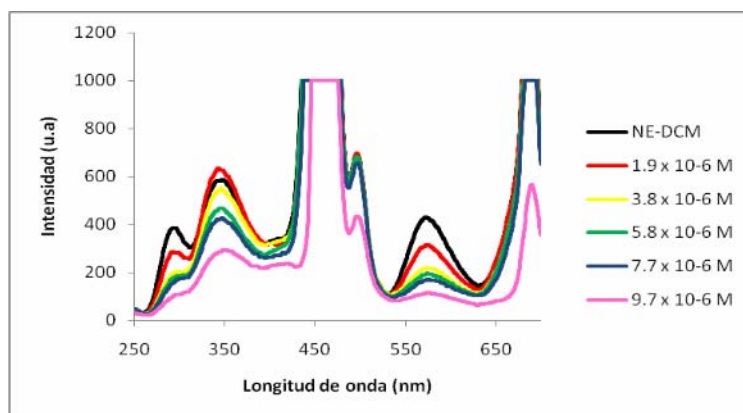


Figure 1- Interaction of CN⁻ anion with dye-functionalized GNPs.