

# **Aryl diazonium group functionalized multi-wall carbon nanotubes: a novel surface to anchor nanoparticles for various applications**

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## **Abstract**

We have developed a simple, reliable, reproducible and efficient technique using infrared irradiation (IR) to functionalize multi-wall carbon nanotubes (MWCNTs) with mono and tricarboxylic aryl diazonium functions and utilize these groups to decorate MWCNTs surfaces with Bi<sub>2</sub>O<sub>3</sub> nanocrystals [1], BaO nanoparticles [2], La(OH)<sub>3</sub> nanoparticles [3] and Fe<sub>2</sub>O<sub>3</sub> nanocrystals [4]. For the first time, Bi<sub>2</sub>O<sub>3</sub> nanocrystals have been formed on MWCNTs. The decoration of the other nanoparticles has already been reported in the literature but in the present case they are for the first time decorated on tricarboxylic aryl diazonium functionalized MWCNTs. Our method of decoration overcomes significantly most of the limitations reported in the literature [5]. This method is also applicable to prepare nanocomposites with other nanoparticles (work in progress). Nanocomposites of MWCNTs and nanoparticles are expected to have characteristics superior to the individual components. The characterization of the elaborated nanostructures was carried out using XPS, FE-SEM, TEM, TGA, RAMAN, EDX, PXRD and UV-Vis. Some of these nanocomposites have been already applied to biomedical (electrochemical sensor) [6], environmental (dye removal) [4] and defense applications (energetic materials) [7]. Other kinds of diazonium functions can also be grafted on CNTs based on the same principle. This novel functionalization process can be used for several applications such as biosensors, dye removal, catalysis, etc. The present methodology is also applicable to large scale preparations. This opens very interesting perspectives for nanotechnology.

## **References**

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