Title	**Nano-carbon hybrid materials for renewable energy conversion and wastewater treatment**
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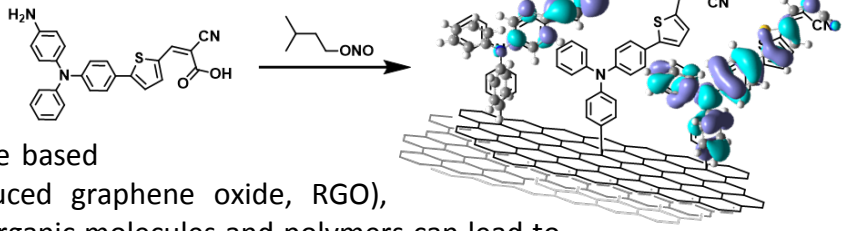
Project description:

The use of carbon nanostructures (CNSs) in energy related applications attracts large attention for different scopes. The combination of CNSs, such as fullerenes, carbon nano-tubes (CNTs) and graphene based materials (e.g. reduced graphene oxide, RGO), with π-conjugated organic molecules and polymers can lead to hybrid systems that are promising as active materials in energy related applications such as photovoltaic devices. Conjugated polymer-nanocomposites, based on functionalized CNTs and RGO, were used as hole transporting materials in perovskite solar cells (PSC). In the field of dye-sensitized solar cells (DSSC), grafting of photoactive molecules on RGO has led to novel photosensitizing agents. The focus of the project is the development of CNS based materials through the functionalization with organic dyes and other moieties, to improve efficiency and stability of non-conventional photovoltaic and photocatalytic devices. It will aim in particular at systematically investigating the use of CNS-organic dye hybrids for stable and performing solar devices using wastewater as electrolyte and source of hydrogen. Dye-Sensitized Photocatalytic and Photoelectrochemical cells for production of hydrogen fuel from wastewater, using graphene-organic dye hybrids as the innovative photoactive units, will be investigated. The PhD candidate will develop interdisciplinary skills such as the organic chemistry and characterization of materials, photophysical properties of organic materials, photocatalysis and degradation of water contaminants. The work will be carried on in strict collaboration with Italian and international research groups.



Publications:

Solar RRL **2018**, *2*, 1800013; *J. Mater. Chem. A* **2017**, *5*, 11882; *Nano Energy* **2017**, *41*, 84; *Carbon* **2017**, *115*, 746; *Adv. Funct. Mater.* **2016**, *26*, 7443.

Collaborations/Network:

M. A. Loi - Groningen University (The Netherlands). A. F. Nogueira -University of Campinas (Brazil). A. Abbotto - Università di Milano Bicocca.

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