PHOTO-DESIGN OF METAL POLYMER NANOMATERIALS AND NANOSTRUCTURES

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The size dependent properties of noble metal nanoparticles (MNPs) have created a great promise for their use in a variety of optical, electronic and biomedical applications. Nowadays, a great diversity of techniques such as chemical, thermal, photochemical or biological and methods have been developed for their synthesis. Among them, photochemical approach has proven to be an excellent tool to synthesize nanoparticles and also nanocomposite materials in the investigation of the mechanistic aspects of their formation. In particular, we present the advantages of a "green" and "highly flexible" character and a strong control in both spatial and temporal directions. In this context, firstly, we will use photochemistry to generate MNPs through photo reduction of a metal precursor using free radicals generated from photosensitizers in an aqueous solution or directly generated onto glass surfaces in order to produce plasmonic surfaces. Thus, efficient nanoparticle synthesis and their morphological control require a careful selection of experimental conditions such as photonic and chemical parameters. Moreover, the photochemical tool was used not only for the nanoparticles synthesis, but also to obtain advanced nanomaterials as nanocomposites metal/polymer. The hybrid nanocomposites have been obtained by combing the *in situ* photoreduction of MNPs with the acrylates monomers photopolymerization. Specific interactions between the macromolecular network and the nascent particles were funded to play an important role insofar as they control the access of metal atoms to the different crystalline planes of the growing nanoparticles, which is necessary to obtain anisotropic objects. The assembling process of MNPs in the polymer matrix was the next step of our work. Controlling both the synthesis and multi-scale organization (nano, micro and macro) of such cross-linked organic-inorganic nanomaterials opens promising prospects in the field of advanced materials.

Biography

Lavinia BALAN obtained the PhD degree from the University Henry Poincaré in Nancy, France, in 2005. Her PhD was devoted to the elaboration of an original material for the anode of Li-ion batteries. After a post doctorate in Orleans and then in Mulhouse, she joined the Department of Photochemistry of Mulhouse in 2006 as a CNRS Senior Researcher. She opened a new field of research in this laboratory, viz. the photo-assisted synthesis of metal nanoparticles and metal-polymer Nano composite. Since December 2009, L. Balan joined the Institute of Materials Science of Mulhouse (IS2M)-CNRS. She has published more than 100 scientific publications, 4 book chapters and 5 patents. Dr. L. Balan has been serving as an editorial board member for few scientific journals. Lavinia BALAN research are concerned with photochemical synthesis of metal/polymer nanocomposites and design, customization and characterization of metal nanoparticles and nanocrystals (quantum dots) suited for advanced applications in the fields of optic, photonics, plasmonics, imaging or biology.

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