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Smart organic-inorganic hybrid nanomaterials: Design and functionality

Nekane Guarrotxena
Spanish National Research Council, Spain

The combination of the unique physical properties (light scattering, emission and absorption, and magnetic response) of inorganic nanoparticles (NPs) with the relevant chemical features derived from the morphology and the microstructure of polymer chains talk by themselves about its key-role played in the development of highly functional nanomaterials and nanocomposites. So far, functional smart polymers are becoming increasingly straightforward to design and synthesize multifunctional nanomaterials with a remarkable range of predictable responses and other properties. A smart polymer, by definition, can convert energy from one form into another by responding to a change in some stimuli (temperature, pH, mechanical strength, or electric and magnetic fields) in its environment. Therefore, smart polymers are used in biotechnology, medicine and engineering, in such applications as drug delivery systems, chemical separation, sensors and actuators. On the basis of the high interest within the scientific community, even when important research has been done along the last years on the effective polymer coating approaches of NPs, the establishment of new protocols for their functionalization is still needed. Within this presentation, we want to highlight the recent progress in their successful integration via multidentate ¨grafting to¨ conjugation which guarantees the highly desirable features, such as compact hydrodynamic size, amphiphilic, pH- and thermo-responsiveness, and enhanced optical properties for future bio- and technological applications of our functional nanohybrid materials. A detailed characterization of these properties will be exposed along.

Biography

Nekane Guarrotxena is a PhD student from the University of Complutense, Madrid-Spain and Post-doctoral researcher at the Ecole Nationale Superieure d´Arts et Metiers (ENSAM), Paris (France) and the University of ScienceII, LEM-Montpellier (France). From 2008-2011, she was visiting Professor in the Department of Chemistry, Biochemistry and Materials at the University of California, Santa Barbara (USA) and the CaSTL at the University of California, Irvine (USA). She is currently Research Scientist at the Institute of Polymer Science and Technology (ICTP), CSIC-Madrid (Spain). Her research interest focuses on the synthesis and assembly of hybrid nanomaterials, nanoplasmonics, and their uses in nanobiotechnology applications (bioimaging, biosensing, drug delivery and therapy).

nekane@ictp.csic.es

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