

# 3<sup>rd</sup> International Conference and Exhibition on Materials Science & Engineering

October 06-08, 2014 Hilton San Antonio Airport, USA

## Designing nanofunctional hybrid materials

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The size- and shape- dependent tunable optical, magnetic, and electronic properties of inorganic nanoparticles make them central building blocks in nanomaterials science, opening interesting pathways to fundamental research, and biomedical- and device- technology. These unique properties can also be customized by surface modification, functionalization or by developing nanocomposites with other nanomaterials and/or polymers for specific applications. Functionalization of inorganic nanoparticles with biocompatible polymers and/or natural or rationally designed molecules offers a route towards engineering responsive and multifunctional composite systems. A stimuli-responsive polymer can significantly change according to the environment it is in. The nonlinear response of these polymers makes them so unique and effective. So far, functional smart-polymers are becoming increasingly straightforward to design nanomaterials with a remarkable range of predictable responses and other properties.

Despite the important work done along the last years on the surface coating of NPs, the establishment of new protocols for their functionalization is still needed. Rational functionalization of NPs with smart and/or biocompatible polymers and copolymers provides new and potential nanosystems in sensing, diagnostic, imaging, magnetic, electronic and structural applications. In this context, a new polymer synthetic protocols and colloidal NPs functionalization approaches to design multifunctional hybrid materials with optimized properties has been developed. This control over nanoparticles surface functionalization at the nanoscale coupled with improved fluorescence, surface plasmon, and surface enhanced Raman scattering-(SERS) properties from them have led to the development of novel functional nanoparticles-based systems with improved and potential clinical and medical applications. Some recent results and strategies will be discussed in this talk.

### Biography

Nekane Guarrotxena is a PhD from the University of Complutense, Madrid-Spain in 1994 and has been doing Post-doctoral research at Ecole Nationale Supérieure d'Arts et Métiers, Paris-France (1994-1995) and University of Sciencell, Montpellier-France (1995-1997). From 2008-2011, she was visiting Professor in the Department of Chemistry, Biochemistry and Materials at University of California, Santa Barbara-USA and the CaSTL at University of California, Irvine-USA. She is currently Research Scientist at Institute of Polymers Science and Technology, CSIC-Spain. Her research interest focuses on the synthesis, surface modification and assembly of hybrid nanomaterials, nanoplasmonics, and their use in nanobiotechnology applications (bioimaging, drug delivery, therapy and biosensing).

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