

MASTER THESIS:

Synthesis and mechanical characterization of multifunctional graphene-based nanocomposites

Motivated students are welcome to join the Functional nanomaterials (FN) group at the Institut de Recerca en Energies de Catalunya (IREC, Barcelona) for a Master thesis. The core activity of the group is the preparation and characterization of novel functional materials for environmental, energy or biomedical applications. Among the different topics developed at the FN group, the candidate will work at the “nanostructured composites” research line. The current activities of this line are focused in the development of novel suprastructures build-up from nanoscaled building blocks (nanoparticles, nanosheets or nanorods). Candidates with backgrounds including chemistry, physics, material science and engineering or medical engineering, are welcome to contact the supervisors providing a CV and a brief description of scientific interests.

Project description:

The candidate will develop a route to produce nanocomposites having a graphene shell and an inorganic/organic core. The core of the nanocomposite will contain dye molecules or functional nanoparticles (magnetic and/or plasmonic) while the shell will be produced from graphene nanostructures. Project foresees a multidisciplinary working plan in which the candidate will be trained in: i) synthesis and structural characterization of inorganic nanoparticles and suprastructures using advanced characterization techniques (TEM, SEM, XRD, BET), ii) synthesis of graphene based nanostructures (quantum dots, graphene oxide nanosheets, etc) and iii) application of nanocomposites in nanomedicine and catalysis. The final project goal is to produce suprastructures having a size below 500 nm and showing both a magnetic response and photoluminescence. The research project will be carried out at IREC in collaboration with the Nanocomposites and Nanostructured Materials Lab (LM2N) at UB. The candidate will have access to cutting-edge research facilities surrounded by an international environment.

Activities

- Colloidal synthesis of oxide, chalcogenide and metallic nanocrystals
- Micro- and nano-emulsion synthesis
- Structural, mechanical and magnetic characterization of nanostructures
- Report writing and communication skills

Supervisors

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