

Title Carbon-clay composites: innovative approaches for clean energy and other advanced applications

Speaker Prof. Eduardo Ruiz-Hitzky
 Department of New Architectures in Chemistry of Materials
 Materials Science Institute of Madrid (ICMM)
 Spanish National Research Council (CSIC), Spain



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Place I2CNER hall, I2CNER Bldg.1, Ito campus,
 Kyushu University

Abstract

Carbon and clays are abundant natural resources known and used as raw materials for centuries around the world. They exhibit very different properties regarding their structural arrangement, electrical and thermal conductivity, rheological characteristics, etc., but both have been assembled to produce diverse type of functional materials with applications in many diverse fields. So, it is possible to prepare carbon-clay hybrids with uses ranging from conventional pencil cores to advanced composites where the presence of highly conductive graphene and/or carbon nanotubes afford their employ in applications from energy production and storage to fillers for polymer nanocomposites, active phases of sensing devices, specific sorbents of pollutants and improving catalytical systems. The assembly of carbon and clay components can be reached through both, *top-down* and *bottom-up* synthetic strategies giving rise to a variety of functional nanostructured materials. The first type of approaches is based on very simple methodologies allowing the assembly of the individual components, where multiwall carbon nanotubes (MWCNT) and graphene nanoplatelets (GNP) assembled to sepiolite fibrous clay applying sonomechanical treatments constitute representative examples of the resulting carbon-clay composites. The second strategy, i.e. the bottom-up approach, is based on the use of organic precursors such as organic molecules, polymers, biomolecules and biomass, which are thermally transformed into carbonaceous materials in the presence of clays such as smectites (e.g. montmorillonite), sepiolite, palygorskite and halloysite. This lecture will discuss on the latest advances on this topic addressing aspects related to the possibility to produce very different carbon-clay hybrid materials showing ability toward functionalization and therefore deserving as advanced materials of great potentiality in diverse applications.

About the Speaker

Prof. Eduardo Ruiz-Hitzky is currently *Ad Honorem* Research Professor at the Spanish National Research Council (CSIC), Head of the Hybrid, Biohybrid and Porous Nanostructured Materials team at the Materials Science Institute of Madrid (ICMM). Docteur en Sciences, Université Catholique de Louvain, (UCL, Belgium) in 1974, and PhD in Chemistry, Universidad Complutense, Madrid (UCM, Spain) in 1979. Author of around 250 publications and 20 patents on Nanostructured Functional Materials; Hybrid, Biohybrid, Intercalation Compounds & Nanocomposites; Layered and Porous Inorganic Solids. Former Director of several Departments at the CSIC including “New Architectures in Materials Chemistry Department” in 2010. Member of the Direction Committee of the Spanish Royal Society of Chemistry (RSEQ) (1989-2013). Vice-President (2002-2006) and President of the Spanish Clay Society (SEA) (2006-2010). Member of the Direction Committee of the ICMM-CSIC (1990-2010). Invited Professor at the Collège de France, Paris, (2011). Editor-in-Chief of Recent Patents in Nanotechnology and Associated Editor of Current Nanoscience, since 2010. Awarded with the STAS Prize (Académie Royal des Sciences, des Lettres et Beaux Arts de Belgique, Belgium), the BRUYLANTS award (Association de Chimistes de l’Université de Louvain, Belgium), the ICIDCA award (The Ministry of Sugar, Cuba), the AIPEA medal (Tokyo, 2005), the National Academy of Sciences of Cuba (2008 and 2016), the Guillaume Budé Medal (Collège de France), and various Distinctions from the CSIC, Spain.

Host: Professor Atsushi Takahara

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Contact: Research Support and International Affairs division
 International Institute for Carbon-Neutral Energy Research
 Tel:092-802-6934 Email:wpikenkyu@jimukyushu-u.ac.jp

