Graphene-based nanocomposites for sensing and biomedical applications

Rabah Boukherroub

Institut d'Electronique, de Microélectronique et de Nanotechnologie (IEMN), UMR CNRS 8520, Université de Lille, Avenue Poincaré, CS 60069, 59652 Villeneuve d'Ascq, France

Recent developments in materials science and nanotechnology have propelled the development of a plethora of materials with unique chemical and physical properties for various applications. Graphitic nanomaterials such as carbon nanotubes, fullerenes and, more recently, graphene oxide (GO)/reduced graphene oxide (rGO) and carbon quantum dots, have gained a great deal of interest for their potential applications in various aspects of science and technology.

Graphene, the name specified to a one atom-thick two-dimensional (2D) single layer of sp^2 hybridized carbon atoms arranged in a honeycombed lattice with large surface area, exceptional thermal, mechanical, optical and structural properties. This wonder material is a "hot topic" of research in interdisciplinary sciences with potential applications in several fields such as nano-electronics, organic catalysis, environmental remediation, drug delivery, etc.

Due to their low cost of production, large specific surface area and abundant surface chemistry, rGO-based materials have shown great promise in the development of novel composites, biosensors,photocatalysts, electrocatalysts, and drug delivery systems. These hybrid nanomaterials offer unusual combinations of electrical, thermal, mechanical, catalytic, electrocatalytic, optical and magnetic performances that are difficult to attain separately from the individual components.

In this presentation, I will focus on the different strategies for the preparation of rGO-based hybrid materials and the various applications of these nanohybrids in sensing and biomedicine.