Researchers design a strategy to make graphene luminescent

30 April 2019

The FQM-346 Organic Chemistry research group at the University of Cordoba came up with a technique to make the material luminescent, which now ushers in a new range of applications. Professor Francisco José Romero Salguero, one of the authors of the research, explains that luminescence is a characteristic of some substances which allows them to emit light at a different wavelength than the one they absorbed it at. In other words, luminescent materials can emit visible light from energy, a property that makes them useful as photocatalysts and fluorescent tags that can be displayed in macromolecules and biological materials. The research was published in Chemistry – A European Journal.

Though previous attempts have been made to endow this super-material with light properties, all of those were unsuccessful. What really makes graphene special is its hexagonal structure based on highly cohesive carbon atoms by means of a kind of electronic cloud in the shape of a sandwich. If the connection between the atoms in this cloud is interrupted, some of the properties are lost, explains researcher Francisco Romero.

The group overcame this obstacle. They were able to incorporate luminescence into graphene without affecting its other qualities, thus safeguarding the functionality of its complex structure. In order to do so, europium was integrated into graphene. Europium is a metal that perfectly coordinates with the modified molecules of graphene and confers luminous properties.

The results offer immediate applications, since this luminescent graphene could be used in biological material and for analyzing tissue cells. However, the research goes even further. The use of europium "is just a concept test," explains University of Cordoba Professor César Jiménez-Sanchidrián.

Henceforth, this study opens the door to the use of...
a variety of chemical elements that could be combined with graphene to confer new characteristics. For instance, if certain kinds of metals are integrated, a magnetic graphene could be generated. Ultimately, it is a line of research that this group will continue to work on with the aim of adding new properties to graphene.

DOI: 10.1002/chem.201900512

Provided by University of Córdoba

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.