Carbonaceous materials and their applications

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Carbon-based materials have widely been used in many different research applications such as toxicology and adsorption, among others. Their physicochemical properties such as their chemical functionalization with heteroatoms (N, S), high-surface area and resistance to acid or basic media have endowed them with beneficial properties for many uses. However, still today, there is a significant challenge to tailor their properties depending on the desired application. In this contribution, a multidisciplinary story about how to custom-make carbon-based materials depending on the final application for their successful use will be explained. Since the discovery of graphene was awarded with the Nobel Prize, multiple routes have emerged to produce graphene-based materials. Graphene Oxide (GO), the oxidized form of graphene, has shown a vast potential for water-based applications due to its high-colloidal stability and 2D structure. In the last decade, a deep effort has been made to assess how its physicochemical properties affected to the final application. As an example, graphene oxide materials with different lateral dimensions and thicknesses were produced and used as biosensors for catechin sensing in environmental and food fields. In this work riboflavin emissions was gradually turned-off after its interaction with GO and replaced by catechin, showing a turn-off-on capacity. From the material point of view, it was demonstrated that large graphene-oxide promoted the best result, showing the highest quenching effect with the least amount of material due to its higher carbon lattice and thickness. In conclusion, the aim of this contribution is to show the versatile character of carbon-based materials to solve some of the nowadays environmental problems.