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Graphene for electrical energy storage: prospects and opportunities

Abstract

In the growing quest for light, portable and wearable devices^[1] as well as automotive power applications, *e.g.*, electric vehicle and plug-in hybrid vehicles, there is an ever increasing demand for sustainable high-performance energy storage devices. Apart the need to provide high energy and power density, other parameters/properties such as cost, lifetime, safety, size/lightweight and flexibility of state-of-the-art devices are hindering the full exploitation of energy storage technology. The aforementioned current limitations will be even amplified for the development of next-generation applications such as wearable electronics and the so-called *internet of things*, where conventional batteries experience flexibility and weight issues. In this perspective, two-dimensional (2D) materials have been proposed as a valuable solution towards a new generation of light and flexible powerful energy storage devices. In this talk, we will present our latest achievements in the field batteries^[1,1] and supercapacitors through the development of novel hybrids based on 2D materials and nanoparticles and how these novel technologies could impact the next-generation energy devices.