

Chemical Tuning of Specific Capacitance in Functionalized Fluorographene

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Abstract

Supercapacitors (SCs) play an important role in the energy storage landscape due to their high power density and long cyclic stability. However, due to the ever-growing demand on portable energy, it is crucial to further enhance the energy which can be stored SCs. Graphene is known as a promising electrode material due to its high conductivity, large surface area¹. Although, the restacking of graphene layers during electrochemical cycling restricts the ion diffusion hence reduce the capacitance and cyclic stability. The covalent functionalization of graphene with suitable organic molecules is a promising strategy for bypassing the restacking of the layers. Moreover, non-agglomerated organic molecules bonded with the single sheet of graphene may enlarge the interlayer spacing which can enhance the ion diffusion². On this basis, we developed a covalent functionalization of graphene with a zwitterionic organic moiety through the nucleophilic substitution reaction of fluorographene with 5- aminoisophthalic acid by adopting facile, one-step and up-scalable synthetic procedure³. The amount of covalently grafted functional groups and density of the sp² carbon is smartly balanced to boost the performance of the full supercapacitor cell built from this material.

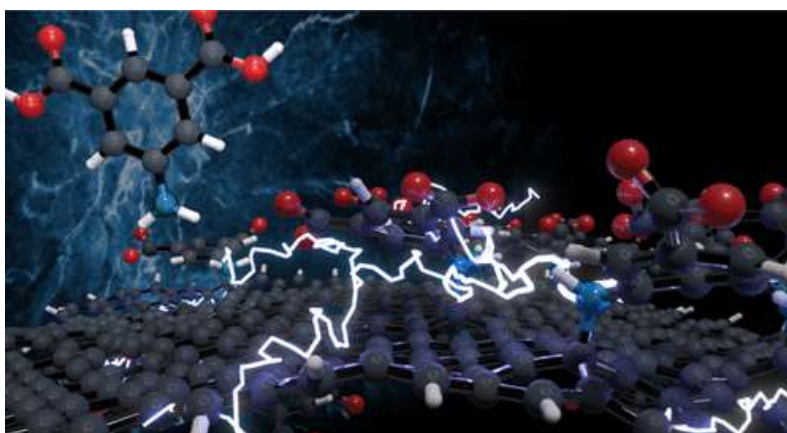


Figure 1: Covalently functionalized graphene schem

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