Performance study on the addition of novel functionalized graphene oxide in activated carbon-based electrodes for capacitive deionization

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Graphene oxide (GO) and its reduced and functionalized forms have been attracting the interest of the scientific community. Widely studied for its unique properties, GO finds applications in the vast and heterogenous scenario of various research fields. When focusing on porous electrodes for capacitive applications, GO is commonly proposed in its reduced form (rGO) for improved electrical conductivity. Specifically, designed functionalization procedures are also used to tune the charges spontaneously present on the surface of GO. In this context, this work reports on the investigation of few novel functionalized GO materials proposed for capacitive deionization application. The modification of the GO has been pursued following different strategies in order to achieve a controlled tuning of the surface charge of the GO. The functionalized materials have been widely characterized by means of morphological, physico-chemical and electrochemical characterization techniques. Finally, the materials have been mixed with activated carbons and coated onto metallic current collectors to assemble a device for capacitive deionization application. Performances of the different materials have been compared in terms of salt adsorption and charge efficiency, proving the beneficial effect of the presence of functionalized GO. Interestingly, the same approach and materials can also be applied for the case of aqueous supercapacitors, since they share many features and similar working mechanism with capacitive deionization.

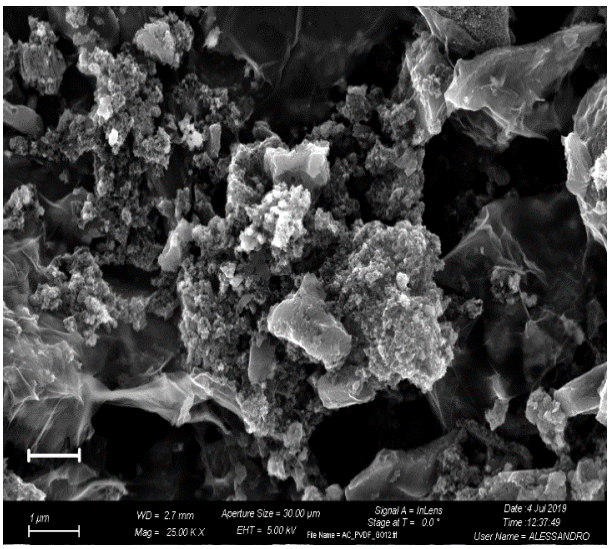

Figure 1: *Graphene oxide in activated carbon matrix.*