Nanohybridazation of Graphene by Ionic Liquids for an Application into Supercapacitor

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The supercapacitor (SC), a circuit component that can temporarily store a large amount of electrical energy and release it when needed, is regarded as a potential future portable energy device due to its high power density, fast charge and discharge rate, long cycle fife time, compared with lithium-ion batteries and conventional capacitors. Recently, graphenes, which are composed of carbon atoms arranged in a honeycomb lattice, has been recognized as potential electrode materials of energy storage devices because of their remarkable electrical properties, chemical and mechanical stability, and large surface area. Herein, we report the nanobybridization of reduced graphene oxides (RGOs) by ionic liquids (ILs) for providing RGOs with special properties while simultaneously obtaining highly stable colloidal suspensions. Owing to the functionality of ILs, RGO/IL hybrids showed higher dispersion capability in organic solvents compared to that of pristine RGO. The specific capacitances of RGO/IL hybrids calculated by cyclic voltametry and galvanostatic charge/discharge were higher than 23.4 F/g of RGO. In particular, RGO/PyrSCN 2 showed seven-folder higher capacitance, 120 F/g, compared to that of RGO.