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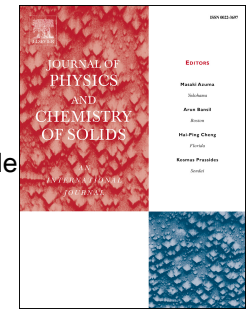

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Green and one-step synthesis for Ag/graphene hybrid supercapacitor with remarkable performance

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Abstract

Highly uniform *reduced graphene oxide/silver nanoparticles* binary nanocomposites were successfully prepared using a consolidated dopamine-mediated multistep procedure and a novel 'green' one-step solution route mediated itself by graphene oxide. In both nanocomposites, Ag nanoparticles (NPs) with sizes of several nanometers result, anchored on the surface of reduced graphene oxide (rGO) sheets. On the other hand, the one-step procedure allows homogeneously dispersed NPs) on highly exfoliated rGO. The rGO/Ag NP nanocomposites were used as electrode materials for supercapacitors. It was observed that the capacitive performances were markedly affected by the size and dispersion of Ag NPs as well as graphene exfoliation. The one-step synthesized nanocomposite exhibited long stability and specific capacitance as high as 1850 F/g in the voltage range [0 **to** 1] V and 628 F/g in the voltage range [-0.5 to 0.5] V at a scan rate of 2 mV/s. The excellent capacitive performance can be attributed to the uniform coating of Ag NPs (~8 nm diameter) on rGO nanosheets in close synergy with rGO resulting in a highly conductive (electrical conductivity up to 1.3×10^7 S/m) spongy material.