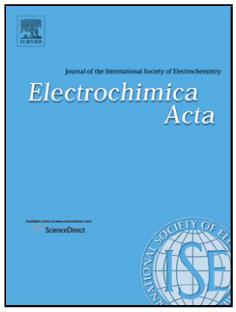

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Facile synthesis of silver nanoparticles supported on three dimensional graphene oxide/carbon black composite and its application for oxygen reduction reaction

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Highlights

►Ag nanoparticles were prepared using GO as reductant without any stabilizers.

►A composite support with a 3D structure was constructed by GO and carbon black. ►The Ag/GO/C composite shows enhanced ORR activity compared with Ag/GO.

Abstract

A 3D graphene oxide/carbon sphere supported silver composite (Ag/GO/C) was synthesized using graphene oxide as the reducing agent. The reducing process of Ag^+ was monitored by the ultra violet-visible (UV-vis) absorption spectrometer and the physical properties of the Ag/GO/C composite were characterized by Fourier transform infrared spectrometer (FTIR), transmission electron microscopy (TEM), X-ray diffraction (XRD) and X-ray photoelectron spectroscopy (XPS). The results demonstrated that the dispersive Ag nanoparticles are anchored uniformly on the surface of GO sheets with a mean size of about 6.9 nm. With introducing carbon black, the Ag nanoparticles aggregated slightly. Compared with its counterpart Ag/GO, the Ag/GO/C composite showed a significantly enhanced activity towards the oxygen reduction reaction in alkaline media. The enhancement can be ascribed to the 3D composite support, which not only improves the electrical conductivity, but also enforces the mass transport in the catalyst layer facilitating the reactants access