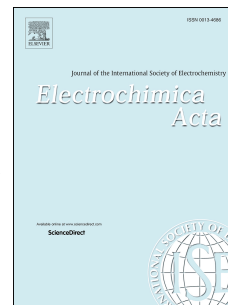


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Novel high-pressure airless spray exfoliation method for graphene nanoplatelets as a stable counter electrode in DSSC

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ABSTRACT

We demonstrate a novel, simple and low-cost exfoliation technique for large-scale production of graphene nanoplatelets (GNPs) directly from natural pristine graphite using high-pressure airless spray. These GNPs were utilized as a back cathode (counter electrode) in dye-sensitized solar cells (DSSCs). Structural analysis of these GNPs was investigated by X-ray diffraction studies and Raman spectroscopy. Cyclic voltammetry (CV) readings indicated that electro-catalytic behavior for triiodide reduction is comparable to that of Pt electrodes. The photo-conversion efficiency DSSCs fabricated using GNPs based counter electrode is found to be 6.72% under standard illumination (1 sun, 100 mW cm⁻², AM 1.5). The GNPs based counter electrode exhibits good stability over 3000 hours under constant illumination with no significant efficiency drop. It is found that the DSSCs fabricated with GNPs based CE shows improved performance in efficiency as compared to other reports where graphene produced by various methods and is used as CE materials.

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