

Sri Lankan vein graphite / polyaniline composite counter electrode for dye sensitized solar cells by screen printing method

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Dye sensitized solar cells (DSSCs) are emerging as promising materials which use renewable solar radiation for ever increasing energy crisis. DSSCs entitled as one of the most prominent third generation solar cells, stand out in the photovoltaic category. Counter electrode (CE) of DSSC is one of the main components which catalyze the redox reaction taking place in the cell and it collects electrons from the external load and sends them to the electrolyte. Platinum (Pt) is widely used as counter electrode material as it gives high efficiencies. However since Pt is extremely expensive, diminishing noble metal and decrease in catalytic activity when exposed to dye solution encourage researchers to find alternatives for Pt electrodes. In this study we report the use of Sri Lankan vein graphite/polyaniline composite as a new counter electrode material. Sri Lankan vein graphite is highly crystalline and is a good low cost alternative to expensive Pt. Polyaniline (PANI) is used as the conducting polymer along with graphite because of its high electrochemical activity. Polyaniline was prepared by oxidative polymerization using aniline and Potassium peroxydisulfate. Polyaniline/Graphite composites were screen printed on Fluorine doped Tin Oxide (FTO) glass substrate using Carboxy Methyl Cellulose (CMC) as the binder. The performance of the new counter electrode was studied by analyzing the I-V characteristics of the DSSCs and the highest efficiency of 5.04% with fill factor of 71.54%. DSSCs with new counter electrode were further characterized by using X-ray diffraction and Fourier Transform Infrared studies.