Short Communication

Copper-Doped Iron Carbide as Counter Electrodes for Dye-Sensitized Solar Cells

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A facile method of pyrolysis of 2-methyl imidazole is used to prepare copper-doped iron carbide materials as counter electrodes for dye-sensitized solar cells. The content of copper in copper doped iron carbide materials are: 0.25%, 0.5%, 0.75%, 1% (molecular proportion). Among these DSSCs made from different Cu content Fe₃C cathodes, the Fe₃C-0.75%Cu based on the Cu content of 0.75% counter electrode yields the highest energy conversion efficiency of 5.68%. Compared to the Pt/C-based DSSC (6.22%), the DSSC fabricated from Fe₃C-0.75%Cu has a similar η . To evaluate the chemical catalysis of copper-doped iron carbide counter electrodes toward I_3^- reduction, cyclic voltammetry and electrochemical impedance spectra are carried out to characterize the counter electrodes. All the results have revealed that doped with copper can improve the catalytic ability of iron carbide counter electrodes. And the copper doped iron carbide counter electrode owns low prices of raw materials, simple production process, so it has very wide application prospects.

Keywords: copper-doped; iron carbide; counter electrodes; DSSC

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