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Dual-Functional Fe₃O₄@N-rGO Catalyst as Counter Electrode with High Performance in Dye-Sensitized Solar Cells

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Abstract

Inspired by the truth that the hierarchy structure nanocomposites can exhibit superior electrochemical performance because such structure can provide more electron transfer routes, here we reported the preparation of Fe₃O₄@N-rGO nanocomposites which can match this point. The power conversion efficiency (PCE) of the cell with Fe₃O₄ nanoparticle as counter electrode is 6.85% while PCE for the cell with Fe₃O₄@N-rGO nanocomposites as counter electrode shows great enhancement, and the highest value is up to 8.18%, even higher than Pt's efficiency (7.17%) in the same environment. The great performance can be ascribed to the hierarchy structure of N-rGO and the excellent conductivity of Fe₃O₄ to achieve dual-functional structure optimization. The 2D hierarchy structure N-rGO film in the hybrids plays two important roles: the more active sites for dispersed Fe₃O₄ nanoparticles promoting catalytic efficiency and the higher electrical conducting structure for quickly charge transfer. The 2D hierarchy structure N-rGO film will be a great help for Fe₃O₄ particles as CE application in DSSCs.

Keywords: Fe₃O₄@N-rGO; Nanocomposite; Counter electrode; DSSCs

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