

ADVANCED MATERIALS 2020: Template synthesis of core-shell WS₂ @N/C nanocage Multifunctional Electrocatalysts for Dye sensitized solar cells- Xiaohui Liu, Yanfang Gao, College of Chemical Engineering, Inner Mongolia University of Technology, Hohhot

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Abstract

Dye-sensitized solar solar and efficient oxygen reduction play an indispensable role in various energy conversion devices due to its acceptable energy conversion efficiency, low-cost and simple production. The counter electrode (CE) plays a crucial role collects electrons from the external circuit and reduces the tri-iodide to iodide species by converting tri-iodide generated at the anode back to iodide, which has a significant influence on the photovoltaic performance. [1] platinum (Pt) is normally used as the CE for reducing the I₃⁻ redox species, and cobalt(II/III) electrolyte and zinc porphyrin dye achieved a highest power conversion efficiency of 12%. [2] However, Pt is an expensive and scarce material. Therefore, it is highly desired to seek for sustainable alternative materials for platinum group metals. [3]

2D transition metal dichalcogenides (TMDs) analogous structure like graphite, its structure is composed of three atomic layers, a W layer sandwiched between two S layers, and the triple layers are stacked by weak van der Waals interaction. [4] Wu et al, used commercial WS₂ as a CE material for DSSCs. They demonstrated that WS₂ was a good candidate to replace a Pt CE in DSSCs. WS₂ is undoubtedly a hopeful material for catalyzing the reduction of I₃⁻. [5]

Metal-organic framework (MOF) synthesized by the assembly of metal nodes and organic linkers, have emerged as promising materials for diverse applications due to their high porosity and ultrahigh surface area. [6] Calcinate the MOF material at high temperature, get the N-doped hollow carbon nanocages. TMDs combined with MOF templating synthesis of few-layered WS₂ Nanoplates confined in Metal-organic framework Nanocages for dye-sensitized solar cells as the counter electrode. [7]

Biography

Yanfang Gao has completed her PhD at the age of 30 years from Fukui University and postdoctoral studies from Tsinghua University of Chemistry. She is a professor at the department of Inner Mongolia University of Technology, a tutor of a PhD student. She has published more than 20 papers in reputed journals.

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