

## ADVANCED MATERIALS 2020: Asymmetric Supercapacitors Based on Fe<sup>3+</sup>-modified V<sub>2</sub>O<sub>5</sub>@GQDs and C/N-Mn<sub>3</sub>O<sub>4</sub> Electrodes with High Energy Density - Zijun Shi, 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 I<sub>3</sub><sup>-</sup> 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 WS<sub>2</sub> as a CE material for DSSCs. They demonstrated that WS<sub>2</sub> was a good candidate to replace a Pt CE in DSSCs. WS<sub>2</sub> is undoubtedly a hopeful material for catalyzing the reduction of I<sub>3</sub><sup>-</sup>. [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 WS<sub>2</sub> Nanoplates confined in Metal-organic framework Nanocages for dye-sensitized solar cells as the counter electrode. [7]

### Biography

Yanfang Gao has completed her PhD in 2005 from the Japanese national fukui university and postdoctoral studies from Tsinghua University School of chemical sciences in 2006 to 2008. Invited to Japanese national fukui university as senior visiting scholar in 2009. Selected to the second procedure of "321 talents project in the new century" in 2010. As a member of "The Chinese youth delegation" visit to Japan in 2009. Her has published more than 30 papers in reputed journals and has been serving as an editorial board member of repute.

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