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Fe and N co-doped carbon with three-dimensional ordered macropores and ordered mesopores as an efficient tri-iodide reduction catalyst for dye sensitized solar cell

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Abstract: Developing low-cost and efficient tri-iodide reduction catalyst is a critical issue for the application of dye sensitized solar cell (DSSC). Heteroatom doped carbon catalyst is an emerging type of catalyst that shows a high potential for practical DSSC application. Herein, we report the synthesis and application of a Fe and N co-doped carbon catalyst with three-dimensional ordered macropores and ordered mesopores. We demonstrate the unique composition and morphology of the synthesized catalyst endowed the catalyst with superior tri-iodide reduction activity. The DSSC based on the novel catalyst shows a photo conversion efficiency of 6.94%, higher than that for commercial Pt/C catalyst. The present work not only suggests the novel catalyst could be a competitive alternative to Pt/C catalyst in DSSC application but also demonstrates the importance of the morphology of the catalyst for its catalytic activity.

Keywords: Fe and N doping, carbon catalyst, macropore, mesopore, counter electrode