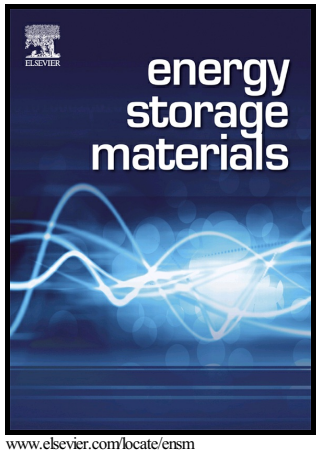


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PII: S2405-8297(18)30110-7
DOI: https://doi.org/10.1016/j.ensm.2018.03.022
Reference: ENSM349

To appear in: *Energy Storage Materials*

Received date: 30 January 2018
Revised date: 7 March 2018
Accepted date: 25 March 2018

Cite this article as: Hao-Fan Wang, Cheng Tang, Bin Wang, Bo-Quan Li, Xiaoyang Cui and Qiang Zhang, Defect-Rich Carbon Fiber Electrocatalysts with Porous Graphene Skin for Flexible Solid-State Zinc–Air Batteries, *Energy Storage Materials,* https://doi.org/10.1016/j.ensm.2018.03.022

**Invited Manuscript for VSI:2D Energy Materials on Energy Storage Materials**

# Defect-Rich Carbon Fiber Electrocatalysts with Porous Graphene Skin for Flexible Solid-State Zinc−Air Batteries

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**Abstract:** Rechargeable flexible Zn−air batteries have attracted great attentions as promising next-generation energy storage devices for portable and wearable electronics. Bifunctional oxygen evolution reaction (OER) and oxygen reduction reaction (ORR) electrocatalysts on the air electrode are critical for improving the energy storage performance of Zn−air batteries. Free-standing electrocatalysts with superb OER/ORR reactivity render promising flexible power sources for the wearable and stretchable devices. In this contribution, a metal-free electrocatalyst based on surface modification of flexible carbon cloth is proposed. A coaxial cable-like structure with carbon fiber skeleton coated by nanostructured porous and defect-rich graphene skin is *in situ* fabricated through a facile $H_2$ etching approach. With abundant heteroatoms and defects as active sites, the nanocarbon shells coated carbon