

Oxygen Evolution Reaction at Carbon Edge Sites: Intrinsic Catalytic Activity Clarified by Polycyclic Aromatic Hydrocarbons

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Abstract

The abundant surface chemical information and edge structures of carbon materials have attracted tremendous interest in catalysis. For the oxygen evolution reaction (OER), edge effects of carbon materials have been rarely studied in detail due to the complexity of various coexisting edge configurations and the controversy between carbon corrosion and carbon catalysis.^[1] In the present work, the exact roles of two common carbon active edge sites (zigzag and armchair, heteroatom-free) in OER using polycyclic aromatic hydrocarbons (PAHs) with designated configurations (Fig.1a) as model probe molecules were interrogated with the focus on structure-function relationships. PAHs would be decorated onto the surface of typical HHT (a commercial high temperature-treated carbon nanofiber, see Fig.1a). The Zigzag configuration of PAHs was experimentally determined to be more active for OER relative to the armchair motif (Fig.1b).

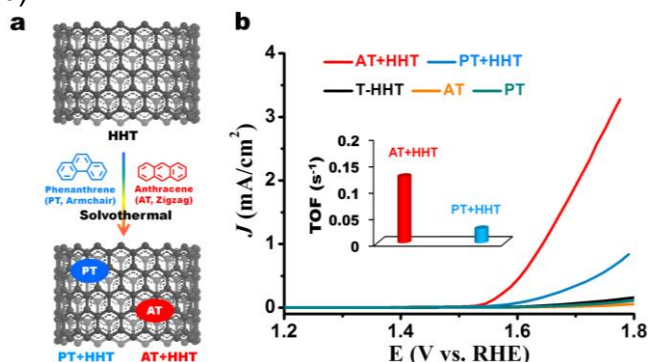


Fig. 1 (a) The schematic process of supported HHT using two kinds of PAHs with designated configurations (zigzag or armchair) as model probe molecules *via* a solvothermal method. (b) LSV curves of various catalysts measured in Ar-saturated 0.1 M KOH, the inset is The TOFs of supported HHT catalysts at 1.6 V vs RHE.

References

[1] X. Lu, W.-L. Yim, B.H. R. Suryanto, C. Zhao, *J. Am. Chem. Soc.* **2015**, 137, 2901-2907.