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Self-Assembly Porous Metal-Free Electrocatalysts Templated from Sulfur for Efficient Oxygen Reduction Reaction

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ABSTRACT: Acetylene black (AB) was exfoliated and functionalized through a single-pot method then be assembled to a novel porous carbon material by utilizing sulfur as both template and sulfur source. The defect-rich structures of the obtained AB play a critical role in providing more appropriate sites for sulfur atom doping. After a pyrolysis process in the presence of melamine as N doping agent, the sulfur template was decomposed and yielded the N,S-codoped porous carbon material with additional porosity. The synergistic effects between the defect-projecting and heteroatoms-doping boost the activity of electrocatalysts in terms of the enhanced oxygen reduction efficiency and optimized kinetic process, both are better than that of commercial Pt/C. And the improved reactivity between carbon atoms and heteroatoms as well as sulfur and nitrogen atoms greatly suppress the loss of active ingredient of the catalyst, the mechanism yields a striking long-term stability for the unique metal-free OAB@S-N electrocatalyst.

KEYWORDS: *acetylene black; sulfur template; porous structures; defect-projecting and heteroatoms-doping; metal-free electrocataly*

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