Scientists propose novel bifunctional catalysts on biomass-derived carbon

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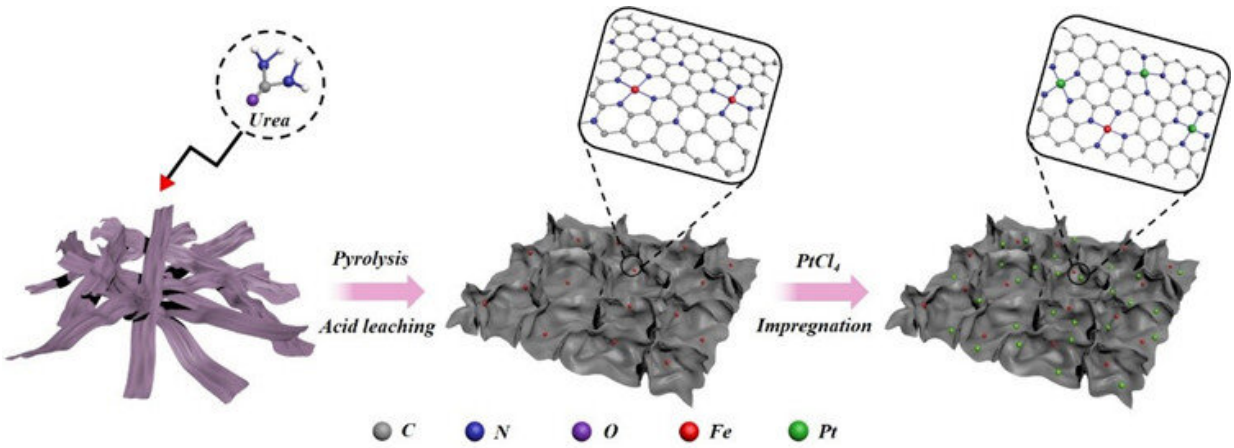

Schematic illustration for the synthesis of Fe_1Pt_1/NC. Credit: CAO Lijuan

Environmentally friendly energy-conversion technologies, such as fuel cells and water-splitting systems, have attracted considerable attention. However, application of these electrochemical devices is hindered due to the high energy barrier of oxygen reduction reaction (ORR) and hydrogen evolution reaction (HER).

Single-atom catalysts (SACs) are the most promising candidates for ORR and HER catalysis. However, most applicable chemicals or precursors for the synthesis of SACs support are generally costly, toxic, or synthesized by relatively complicated processes.

Recently, a research team led by Prof. Liang Hanpu from Qingdao Institute of Bioenergy and Bioprocess Technology (QIBEBT) of the Chinese Academy of Sciences (CAS) put forward a feasible way to synthesize environmentally friendly, inexpensive, and efficient Fe/Pt single-atom bifunctional electrocatalysts (Fe_1Pt_1/NC).

The related progresses were published in *ACS Sustainable Chemistry & Engineering*.

Fe/Pt bimetallic single atoms was anchored on N-doped carbon derived from renewable porphyra via internal nitrogen doping of porphyra followed by nitrogen anchoring of Pt^{4+} in aqueous solution.

The presence of uniformly dispersed active sites of Fe-N_4 and Pt-N_4 endowed the Fe/Pt single-atom electrocatalysts with enhanced bifunctional electrocatalytic performance.

Fe_1Pt_1/NC electrocatalysts exhibited considerably improved ORR and HER electrocatalytic activity in comparison with commercial Pt/C and most previously reported electrocatalysts.

This study sheds light on the design of highly active multifunctional single-atom electrocatalysts derived from renewable biomass for practical applications in the promising hydrogen economy.

More information: Lijuan Cao et al. Highly Active Fe/Pt Single-Atom Bifunctional Electrocatalysts on Biomass-Derived Carbon, *ACS Sustainable Chemistry & Engineering* (2020). DOI: 10.1021/acssuschemeng.0c06558

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