Metal-Organic Framework Derived Co-N-C Electrocatalysts for Efficient Hydrogen Evolution in Acid and Alkaline Media

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Hydrogen have been attracted great attentions as an efficient energy carrier due to the advantage of high gravimetric energy density and clean use through fuel cells or CO_2 free combustion. Among the various methods to produce the hydrogen, water splitting using hydrogen evolution reaction (HER) coupled with oxygen evolution is considered as an effective way to use renewable energy resources. Considering the demand growth for hydrogen production, it is necessary to develop the cost-competitive non-noble metal catalyst with high activity and durability.

In this study, we present cobalt-embedded electrocatalysts supported on 3D-structured nitrogen-doped carbon (Co-N-C) by simple carbonization of cobalt-based metal-organic framework (MOF), affording improved catalytic performance and durability in both of acid and alkaline media. The Co-N-C from Co/Zn hybrid precursor exhibits low overpotential, high current density and remarkable durability for HER compared with the catalyst from single Co-MOF. The effects of increasing the reaction sites and improving the mass transport by the unique structure, which is formed by evaporation of zinc species during the carbonization, will be discussed in the conference.