

Bifunctional Iridium-based catalysts for electrochemical water-splitting

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Abstract

An attractive development of bifunctional catalysts that are efficient for both the hydrogen evolution reaction (HER) and the oxygen evolution reaction (OER) is introduced. In general, loading noble metals is considered as one of the efficient strategies because of their low redox potential and good electrical conductivity. However, their high cost and scarcity seriously limited their large-scale applications, and hence is crucial to explore noble-metal-alternative co-catalyst. Recent studies have pointed out that transition metal oxides exhibit promising electrochemical properties and are being studied to replace noble metals. In addition, the OER of bifunctional catalysts remains a great challenge, such as the poor catalytic activity and stability in acidic environments because its electrochemical reactions involve four-electrons transition which is complicated than HER. To overcome these problems, we utilized Ir-based nanocomposites to fabricate high performance catalysts. Finally, the OER and HER mechanisms are discussed, as well as probable strategies for future development.

Keywords – Electrochemical water-splitting ; Bifunctional catalyst ; Hydrogen evolution reaction ; Oxygen evolution reaction ; Iridium