

Tetraruthenium Polyoxometalates as a Bifunctional OER/ORR Catalyst for Seawater Batteries

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Seawater batteries have been significant attention as alternative batteries attributed to high theoretical specific energy density (1683 W h kg^{-1}). However, it has limitations originating from sluggish kinetics during the oxygen evolution and reduction reactions (OER and ORR) at the cathode. Although development of efficient catalysts with earth-abundant elements is desired, precious noble metal-based catalysts are still widely used and studied for enhancing sluggish kinetics. In this research, we found that oxo-bridged tetraruthenium polyoxometalate (RuPOM) can act as an electrocatalytic catalyst for both OER and ORR with minimal use of noble metal elements and can be used for the development of efficient seawater batteries. RuPOM catalyst decreased overpotential and showed high electrochemical performance at seawater conditions. By incorporating conducting Ketjen black, RuPOM slurry had a high electrochemical surface area, bifunctional electrocatalytic activity, and decreased charge transfer resistance also. This study can provide insights into the development of POM-based electrocatalysts and their application in energy storage and conversion devices.