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Self-supporting Porous Pt-Ag Aerogel as Highly Bifunctional Active Electrocatalysts for Oxygen reduction and Methanol oxidation

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Three-dimensional (3D) porous metal aerogels as a self-supporting proton structure show excellent ability to transmit protons. However, the reported metal porous aerogels are still in the field of electro-catalysis need to be further improved. In this study, we designed a simple method of hydrothermal reduction to prepare the hydrogel of 3D assembled metal nanowires, which obtain the metal aerogels by freeze drying for high surface area and porosity. Under the electron microscope, the aerogels exhibit a high density nanowire structure with a particle size of 7.6 nm, which contributes to excellent electro-catalytic activity. Specifically, the specific/mass activities of the resultant Pt_{0.6}Ag₁ aerogel for oxygen reduction reaction (ORR) are 2.7/3.3 times higher than commercial Pt/C catalyst, respectively. Which are 4.1/5.5-fold compared with those of Pt/C catalyst for methanol oxidation reaction (MOR), respectively. At the same time, the sample also has excellent electro-catalytic stability because the introduction of Ag to produce oxygen-enriched effect, coordination of Pt to improve the ability of anti-intermediate poisoning. The successful synthesis of metal aerogels by this green method has a very broad prospect.

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