ANODIZED ALLOYS AS HIGHLY ACTIVE OXYGEN EVOLUTION REACTION ELECTROCATALYSTS

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Anodic oxidation is a simple and low-cost process for producing high-surface-area nanostructured films. The approach has been used to prepare a variety of metallic oxide materials, including nickel oxide, iron oxide, titanium oxide, cobalt oxide, copper oxide, zinc oxide, and other transition metals, with anodization processing conditions playing a critical role. However, very few studies on alloy anodization and the synthesis of mixed metal oxides have been reported so far.

In this work, we highlight the potential of anodization of complex multicomponent materials made of transition-metal elements, which could constitute a very important method for preparing catalytic nanostructured films. Furthermore, the use of anodization along with heat treatments to modify starting alloys and boost the catalytic activity of the resulting material for oxygen evolution reaction (OER) is explored. The OER activity and stability of the developed catalysts were assessed in 1 M KOH electrolyte. Results showed pronounced enhancement of the OER activity with respect to the initial alloy, with an overpotential of only 233 mV to achieve the current density of 10 mA cm^{-2}. Moreover, no decrease in activity was observed during a 24-h-long chronoamperometric test at the current density of 10 mA cm^{-2}, indicating remarkably high stability.

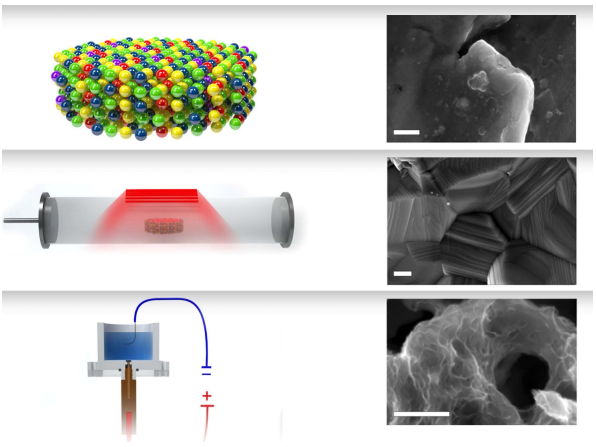

Figure 1. Schematics of the new methodology for the synthesis of immobilized multicomponent nanostructured films (left) and scanning electron microscopy micrographs of the top surface morphology during each synthesis step (right). Scale bar size is 200 nm.

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