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# Enhancing Alkaline Hydrogen Evolution Reaction Performance via Controlling Surface Distortion of FeRu Nanoparticles

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Rational design of electrocatalysts, including an increased catalytic surface area, a unique surface structure, and improved conductivity, for facilitating the hydrogen evolution reaction (HER) is emerging as an important issue. In this work, we consider the engineering of catalyst surfaces as an effective and feasible way to accelerate the HER kinetics. By etching the surface Fe of FeRu alloy nanoparticles (NPs) using hydrofluoric acid (HF), a distorted catalytic surface of FeRu NPs was formed. The distorted surface of the HF-treated FeRu NPs was successfully analyzed by X-ray absorption spectroscopy, high-resolution photoemission spectroscopy, and electrochemical absorption/desorption experiments. The electrocatalytic HER activity of the HF-treated FeRu NPs demonstrated that surface distortion enhances the water dissociation reaction and the electron transfer rate. As a result, the surface-distorted FeRu NPs improved HER performances in alkaline media compared to the pristine FeRu alloy NP/C, commercial Ru/C, and the state-of-the-art Pt/C catalysts.

## Paper submission Plan

## Best Presentation

## Contribution track

ICABU WG4. Applications of Particle Beams

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