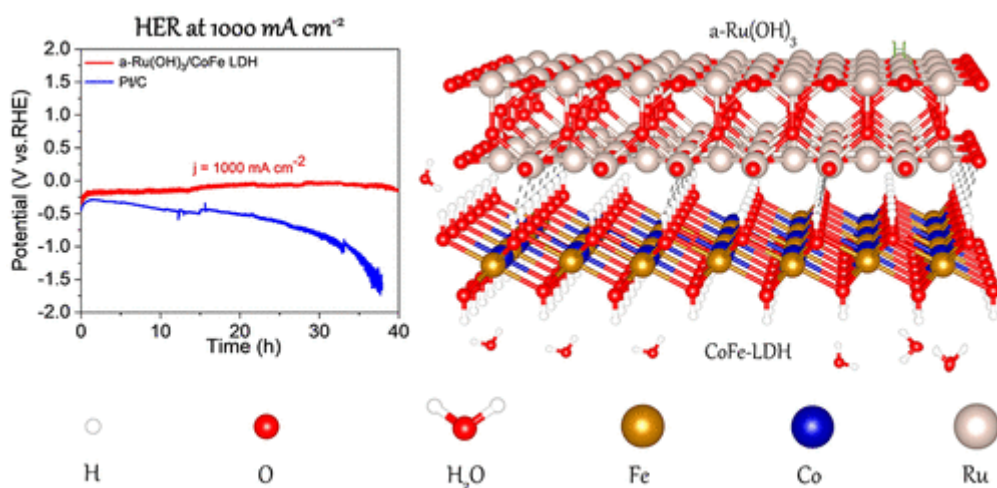


Engineering Amorphous/Crystalline Ru(OH)₃/CoFe-Layered Double Hydroxide for Hydrogen Evolution at 1000 mA cm⁻²

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ABSTRACT: For large-scale industrial applications, it is highly desirable to create effective, economical electrocatalysts with longterm stability for the hydrogen evolution reaction (HER) at a large current density. Herein, we report a unique motif with crystalline CoFe-layered hydroxide (CoFe-LDH) nanosheets enclosed by amorphous ruthenium hydroxide (a-Ru(OH)₃/CoFe-LDH) to realize the efficient hydrogen production at 1000 mA cm⁻², with a low overpotential of 178 mV in alkaline media. During the continuous HER process for 40 h at such a large current density, the potential remains almost constant with only slight fluctuations, indicating good long-term stability. The remarkable HER performance can be attributed to the charge redistribution caused by abundant oxygen vacancies in a-Ru(OH)₃/CoFe-LDH. The increased electron density of states lowers the charge-transfer resistance and promotes the formation and release of H₂ molecules. The water-splitting electrolyzer with a-Ru(OH)₃/CoFe-LDH as both an anode and a cathode in 1.0 M KOH demonstrates stable hydrogen production and a 100% faradic efficiency. The design strategy of interface engineering in this work will inspire the design of practical electrocatalysts for water splitting on an industrial scale.

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