Title:	Designing Ultrathin Rhodium Metallenes for Efficient Hydrogen Evolution in Alkaline Medium and their Kinetic Studies.
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Abstract:	Hydrogen has emerged as a clean and economical energy source, due to its high mass energy density. Hydrogen as a green energy source contributes to zero carbon footprint and mitigates the problem of global warming and climate change. Electrochemical water splitting is regarded as one of the most economical and eco-friendly approaches for hydrogen evolution. Recently, emerging two-dimensional (2D) nanomaterials have demonstrated their potential for hydrogen evolution. These ultrathin nanomaterials are dramatically different from their bulk counterparts. Abundant active sites are maximally exposed and the small diffusion paths of the ultrathin nanosheets can effectively facilitate charge transfer in the electrocatalytic hydrogen evolution. Herein, we designed a Rhodium based ultrathin electrocatalyst that can efficiently produce hydrogen via hydrogen evolution reaction. It exhibits a small overpotential of 25.4 mV at 10 mA cm −2 and good durability in alkaline media. Further, these Rh nanosheets demonstrated a very low activation energy barrier for the hydrogen evolution reaction (HER) observed during the temperature-dependent reaction kinetics study, highlighting the intrinsic superiority of these for electrolyzer applications.
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