

**Ultralow Ru incorporated MoS₂ nanosheet arrays for efficient
electrocatalytic hydrogen evolution in dual-pH**

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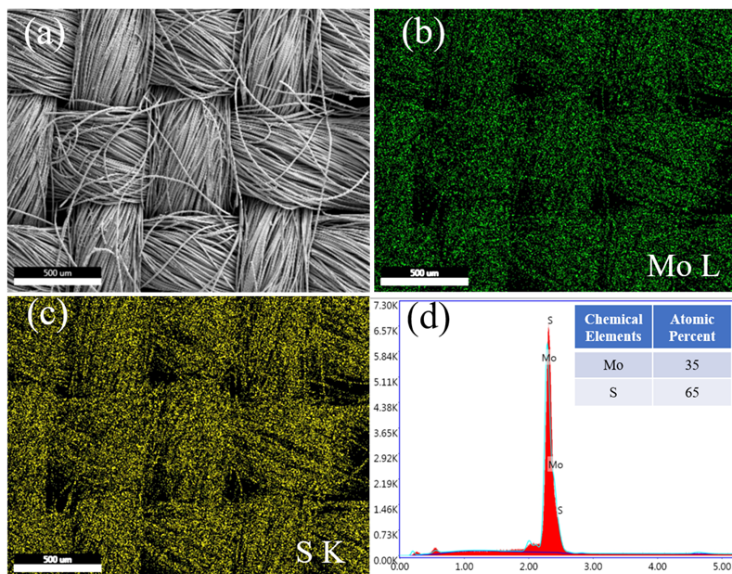


Figure S1 EDS spectrum of MoS₂/CC.

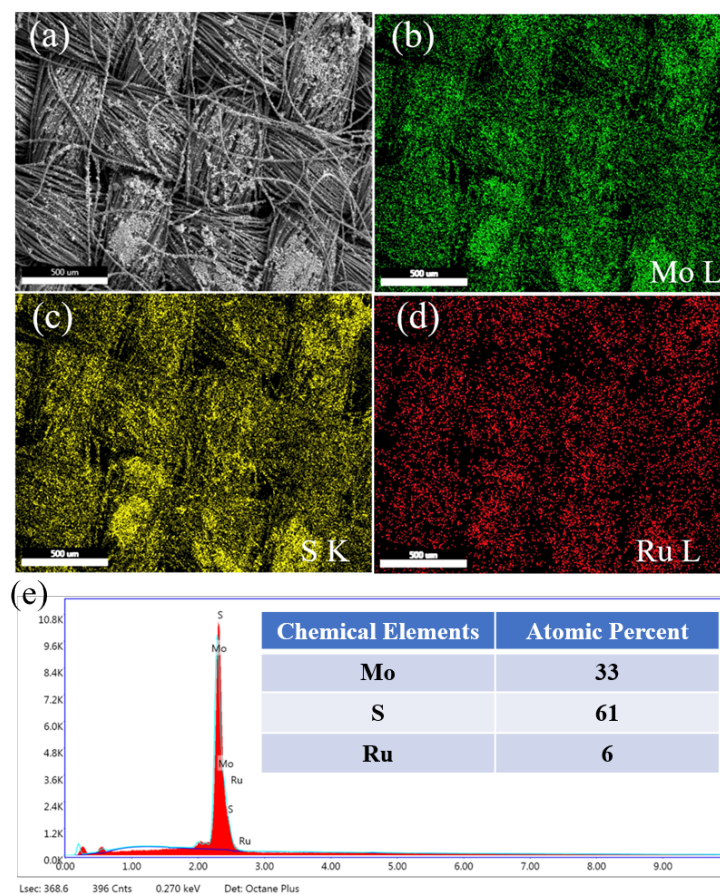


Figure S2 EDS spectrum of 0.005-MoS₂/CC.

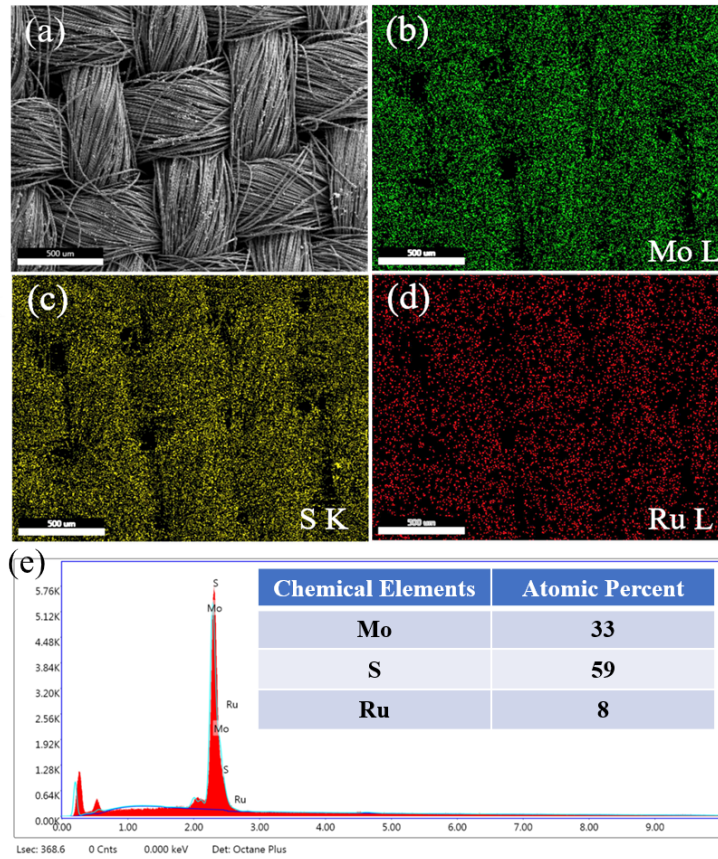


Figure S3 EDS spectrum of 0.01-MoS₂/CC.

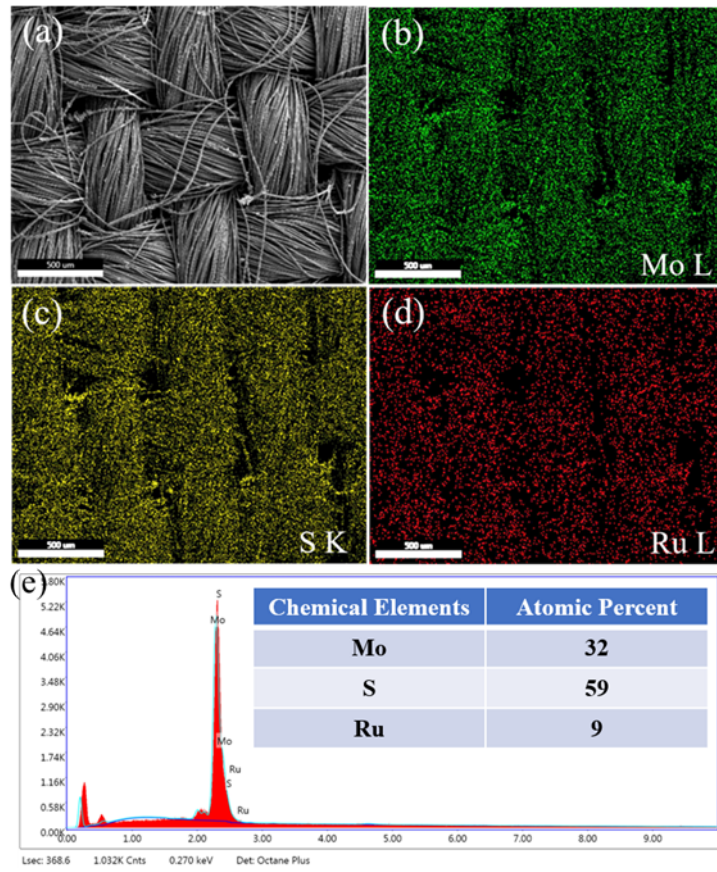


Figure S4 EDS spectrum of 0.015-MoS₂/CC.

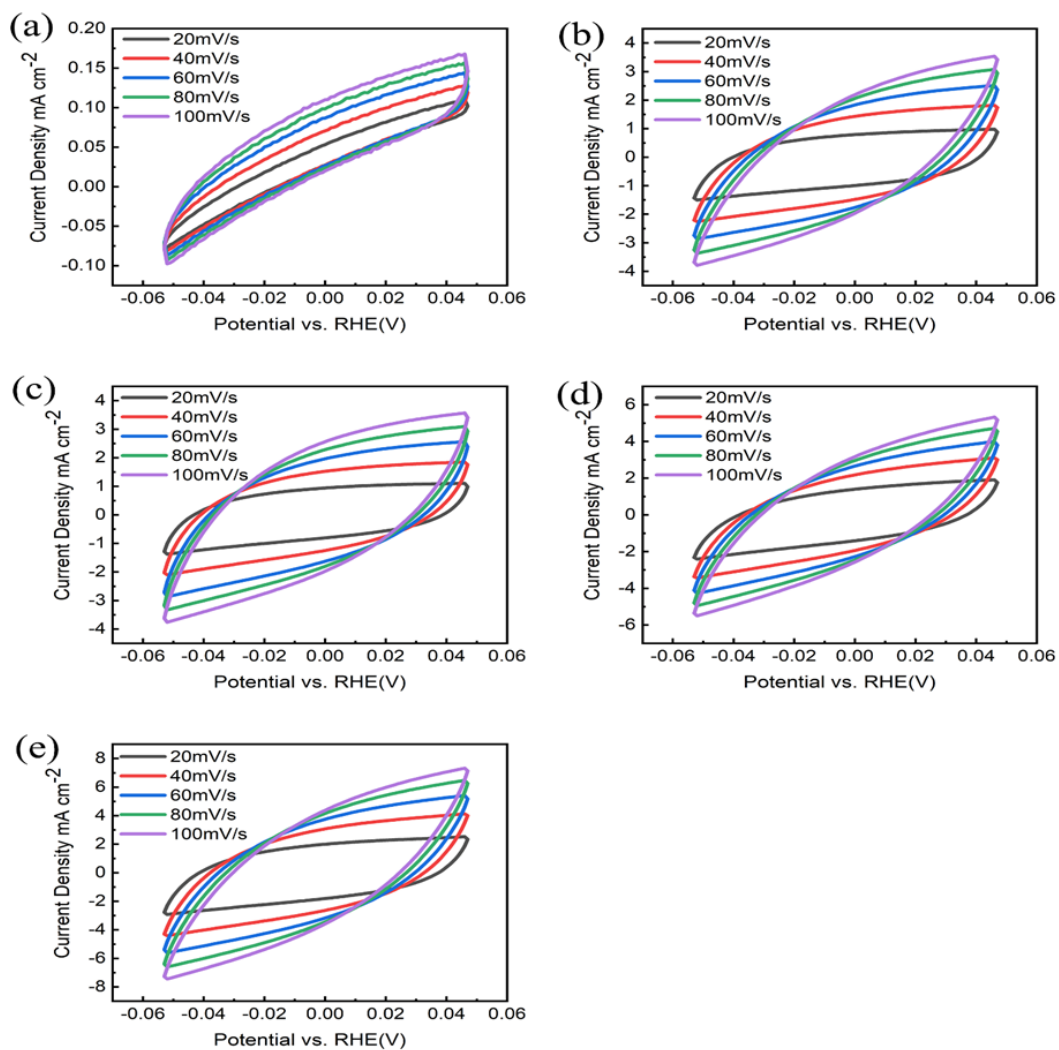


Figure S5. CV curves for (a) CC, (a) MoS_2/CC , (b) $0.005\text{-Ru-MoS}_2/\text{CC}$, (c) $0.01\text{-Ru-MoS}_2/\text{CC}$ and (d) $0.015\text{-Ru-MoS}_2/\text{CC}$ at different scan rates with 20, 40, 60, 80, and 100 mV s^{-1} in 0.5 M H_2SO_4 .

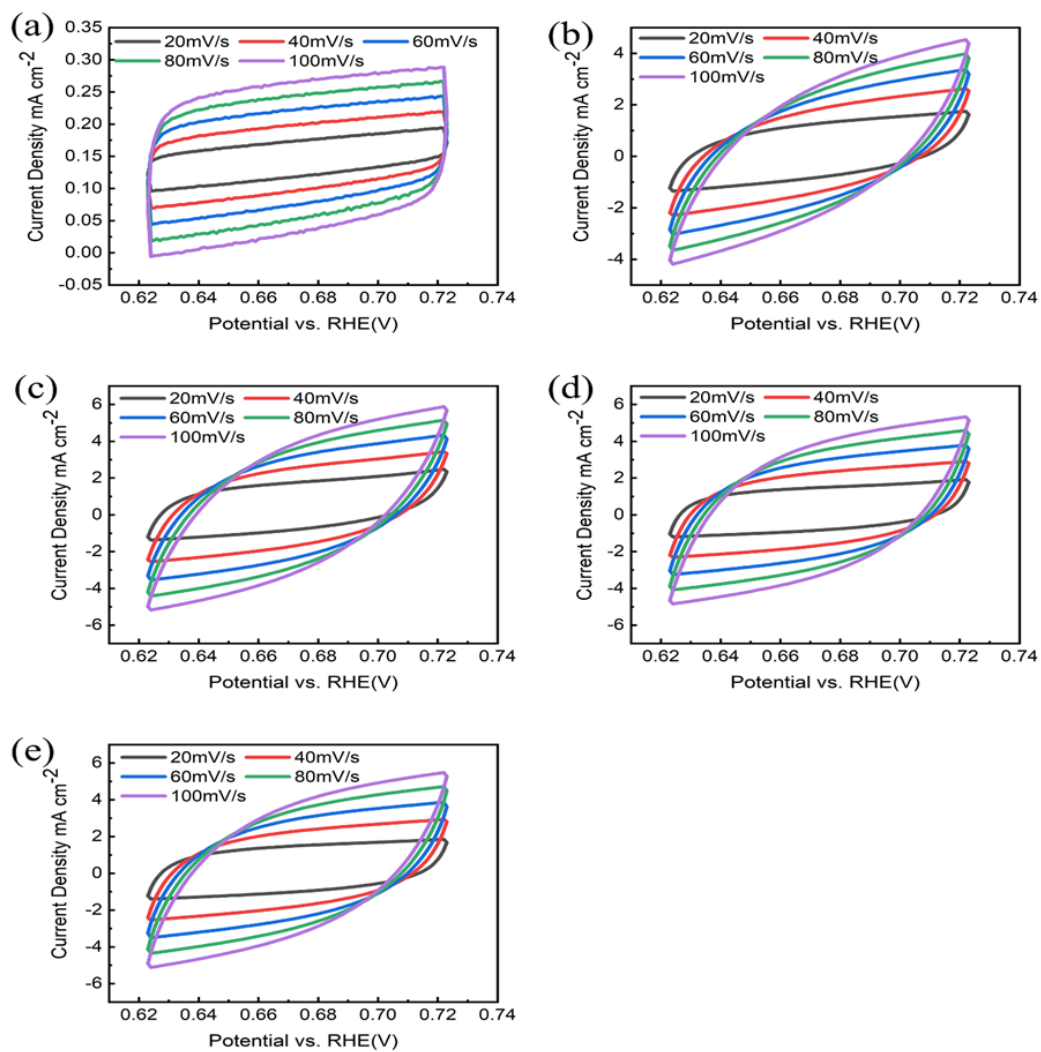


Figure S6. CV curves for (a) CC, (a) MoS₂/CC, (b) 0.005-Ru-MoS₂/CC, (c) 0.01-Ru-MoS₂/CC and (d) 0.015-Ru-MoS₂/CC at different scan rates with 20, 40, 60, 80, and 100 mV s⁻¹ in 1 M KOH.

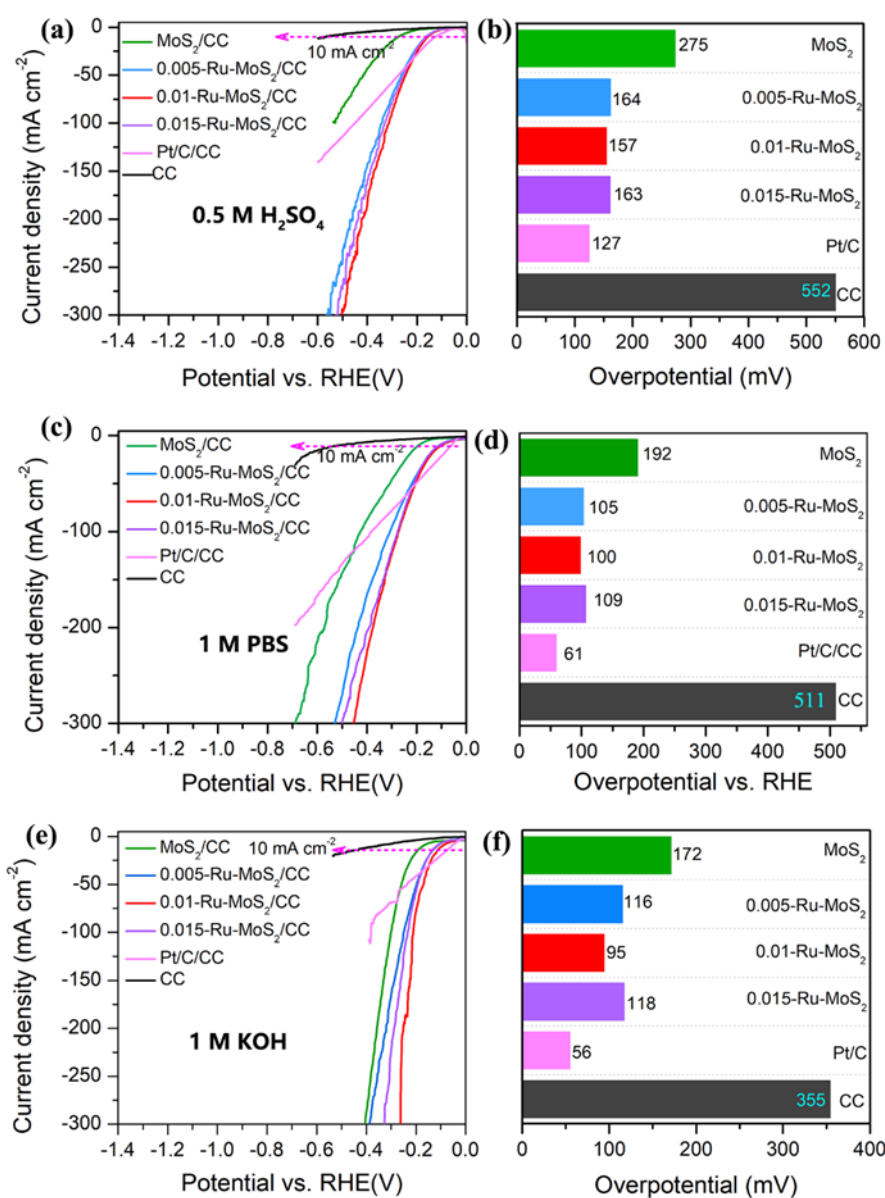


Figure S7. Polarization curves of all synthesized catalysts with carbon plate as the counter electrode

(a, b) 0.5 M H₂SO₄, (b, c) 1M PBS and (e, f) 1M KOH.

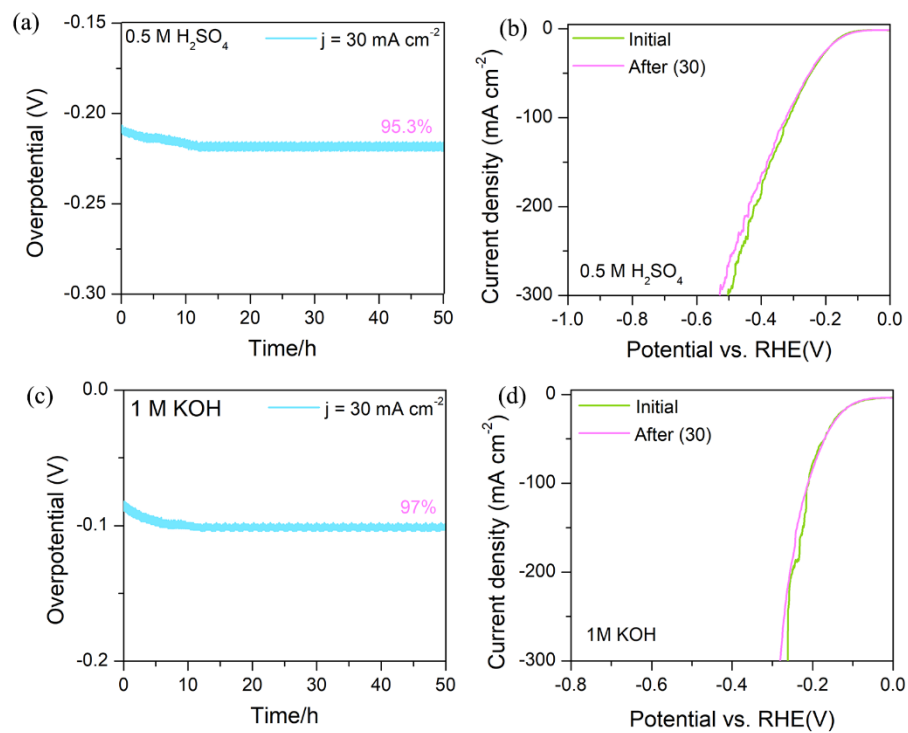


Figure S8. Stability curves and polarization curves of 0.01-Ru MoS₂/CC at 30 mA cm⁻² for 50 h in

(a, b) 0.5 M H₂SO₄ and (c, d) 1.0 M KOH with carbon plate as the counter electrode.

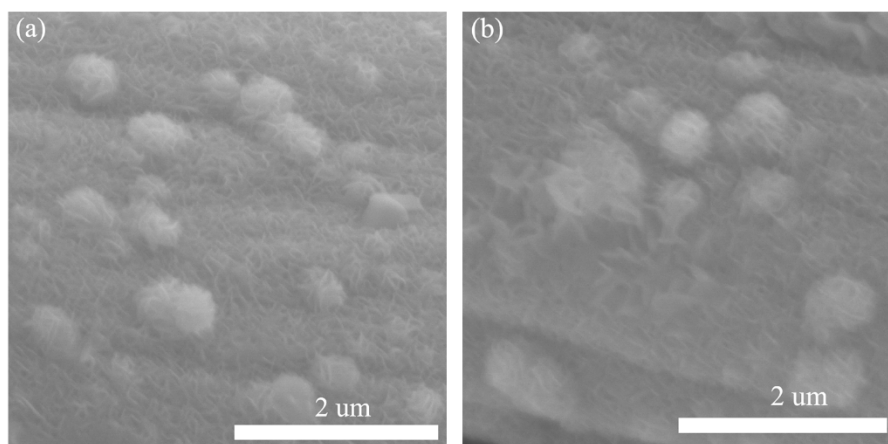


Figure S9. SEM images of 0.01-Ru MoS₂/CC after HER stability test at 30 mA cm⁻² for 50 h in (a)

0.5 M H₂SO₄ and (b) 1 M KOH solution, respectively.