

## Amalgamation-based AuHgPt Nanochains as Electrocatalysts for Hydrogen Evolution Reaction

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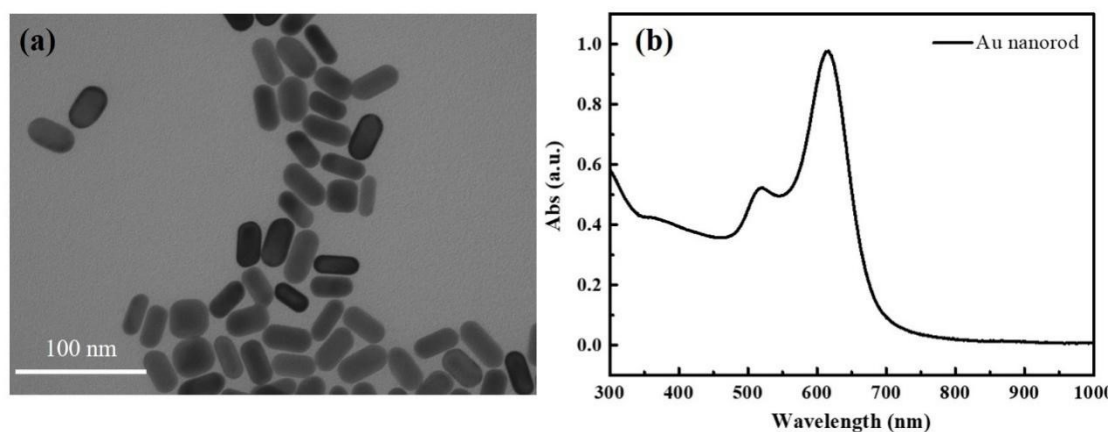


Fig. S1 (a) TEM image and (b) corresponding UV-Vis absorption spectra of Au NRs synthesized by seed-mediated method.

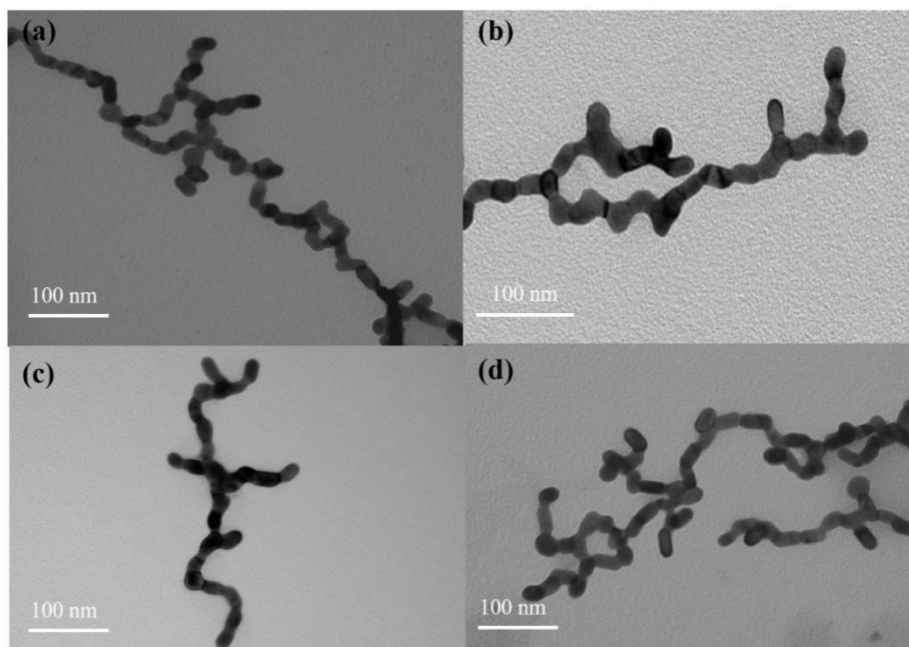


Fig. S2 (a)-(d) TEM images of AuHgPt-1, AuHgPt-2, AuHgPt-3 and AuHgPt-4.

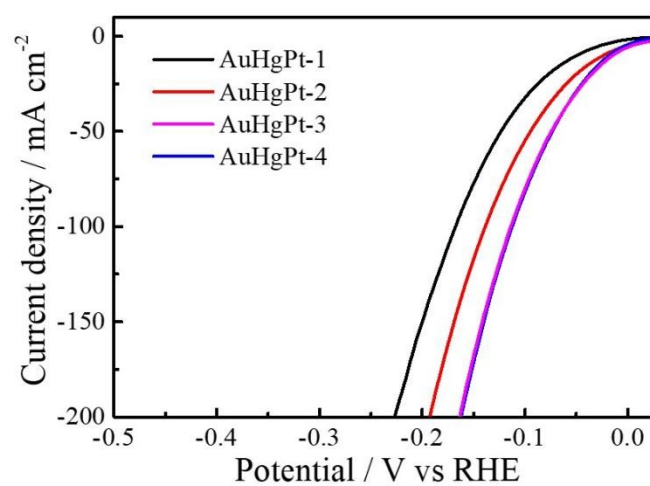


Fig. S3 HER polarization curves of AuHgPt-1, AuHgPt-2, AuHgPt-3 and AuHgPt-4.

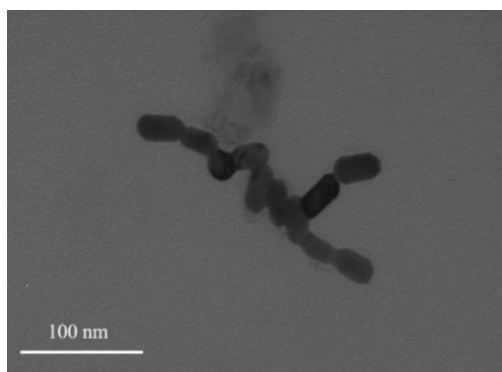


Fig. S4 TEM image of AuHgPt nanochains after electrochemical test.

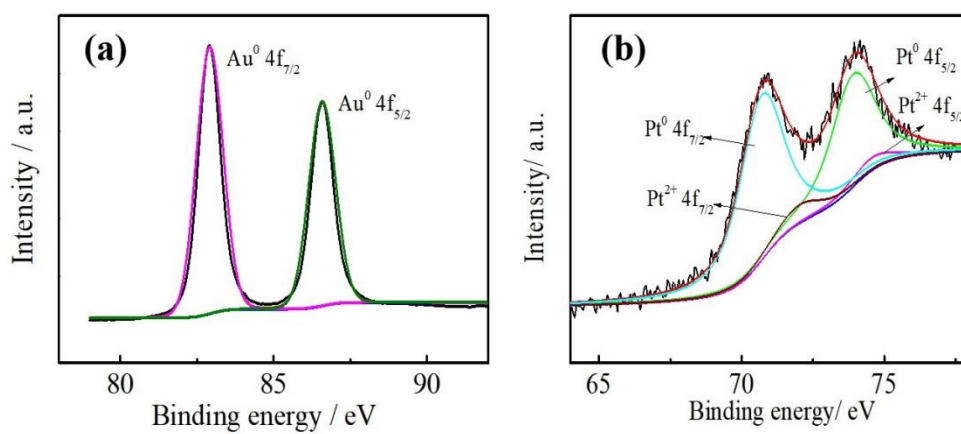


Fig. S5 X-ray photoelectron spectra of Au 4f, Pt 4f (a-b) after stability test.

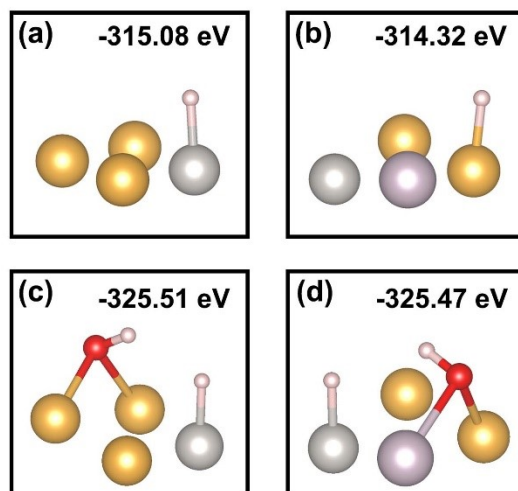


Fig. S6. (a) and (b) The adsorption configuration and the total energy of H adsorbed on Pt and Au sites of AuHgPt, respectively. (c) and (d) The atomic configuration and the total energy of H and OH co-adsorption on AuHgPt, with H adsorbed on Pt site and OH adsorbed at Au bridge and Hg-Au bridge site, respectively.

Table S1. Summary of the HER activity of Pt-based alloys used in alkaline solutions.

Electrocatalyst	Overpotential (mV)	Tafel slope (mV·dec <sup>-1</sup> )	Reference
PtNi <sub>5</sub>	26.8	19.2	1
PtFeNiCuCo	27	34.7	2
PtCo@PtSn	25	24	3
Pt@Ni <sub>2</sub> -rGO	37	43	4
PtSe <sub>2</sub> /Pt	42	53	5
PtNi <sub>10</sub> /C	66	16.73	6
PtRu/CNT@CeO <sub>2-x</sub>	75	38	7
Pt/Co-N-C	33	36.8	8
AuHgPt	23	47.72	This work

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