

# Supplementary Information

## Preparation of Metal Amalgam Electrodes and Their Selective Electrocatalytic CO<sub>2</sub> Reduction for Formate Production

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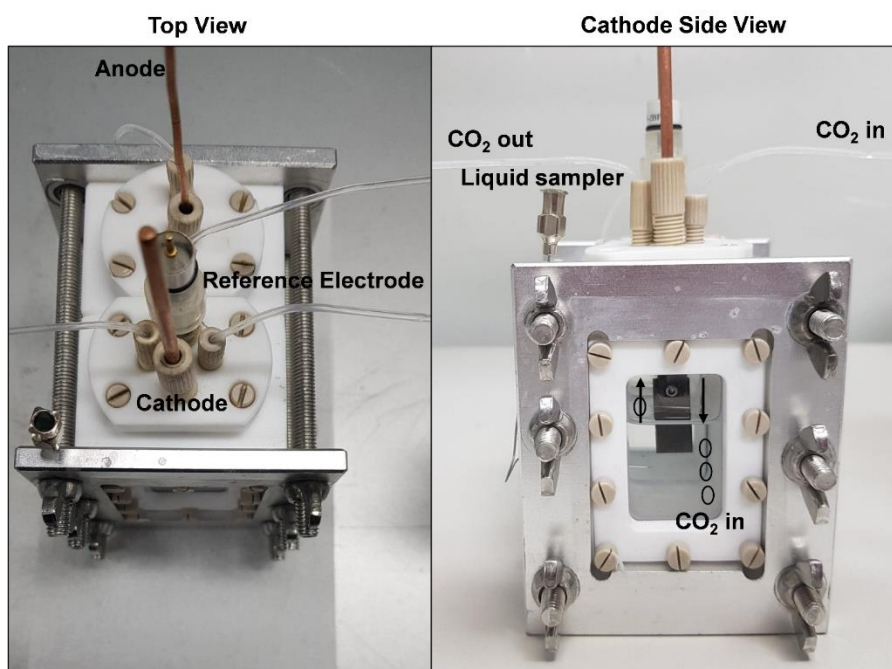


Figure S1. Experimental setup (Scheme) for electrochemical CO<sub>2</sub> reduction measurements.

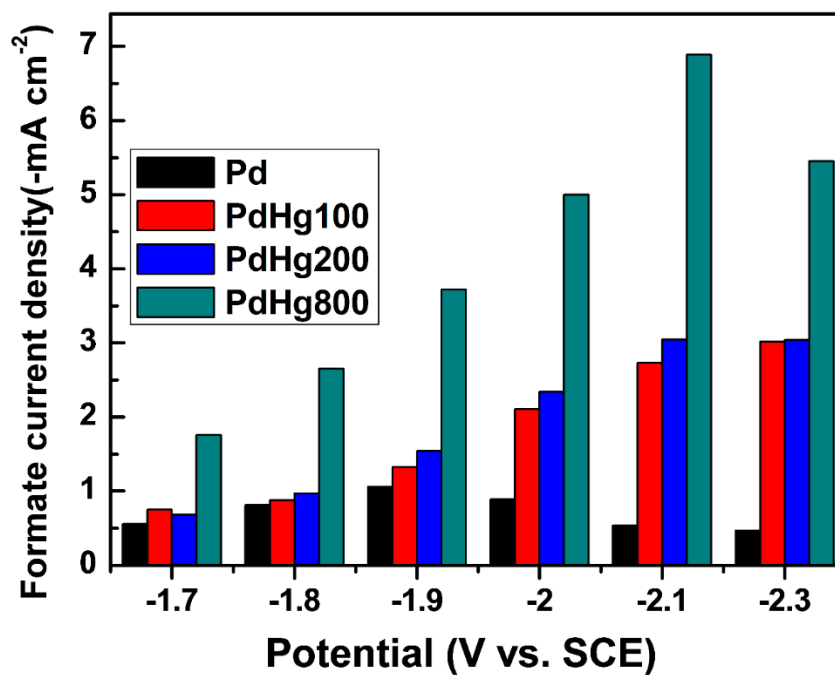


Figure S2. Formate current density of Pd, PdHg100, PdHg200 and PdHg800 at the potential range of -1.7 to -2.3 V vs SCE.

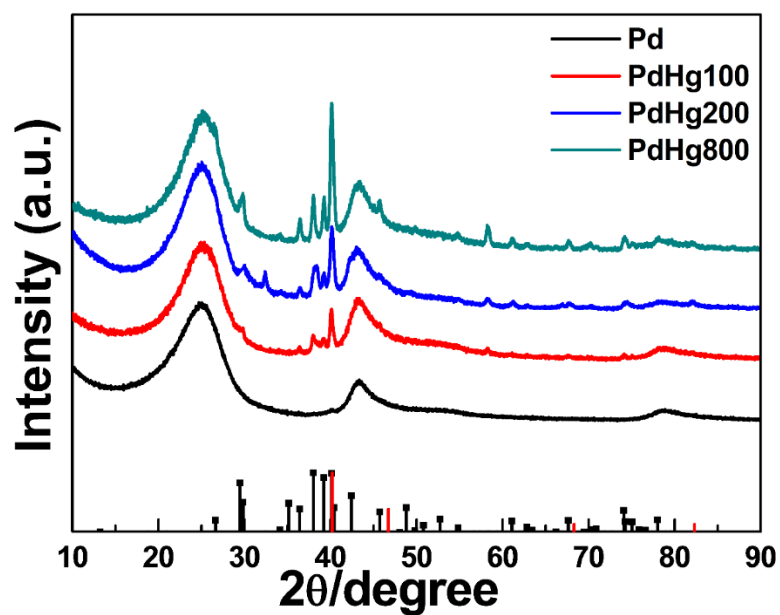


Figure S3. XRD patterns of Pd, PdHg100, PdHg200 and PdHg800.

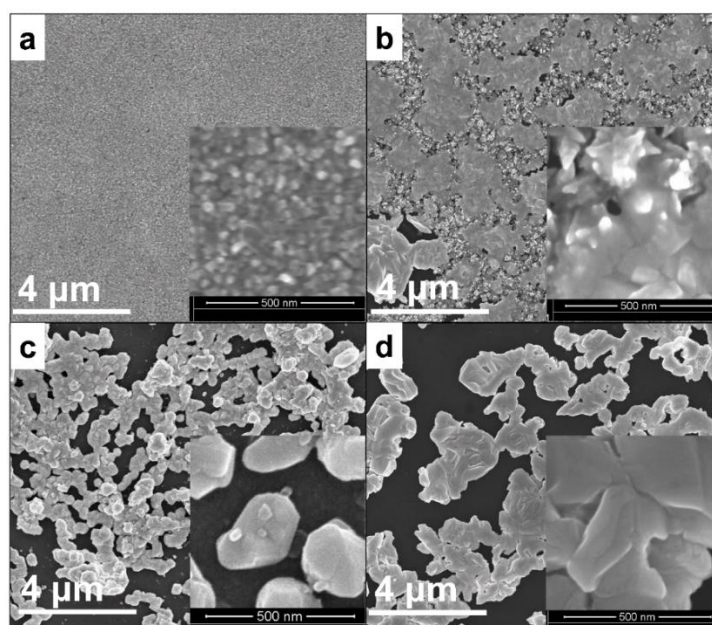


Figure S4. SEM images of the electrodeposited (a) Pd, (b) PdHg100, (c) PdHg200 and (d) PdHg800.

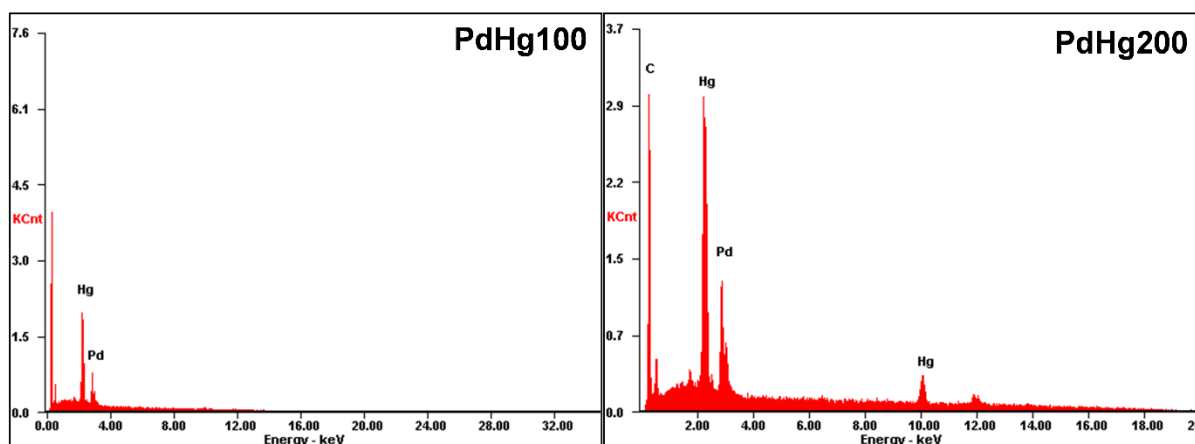


Figure S5. EDS Analysis of the prepared samples PdHg100 and PdHg200.

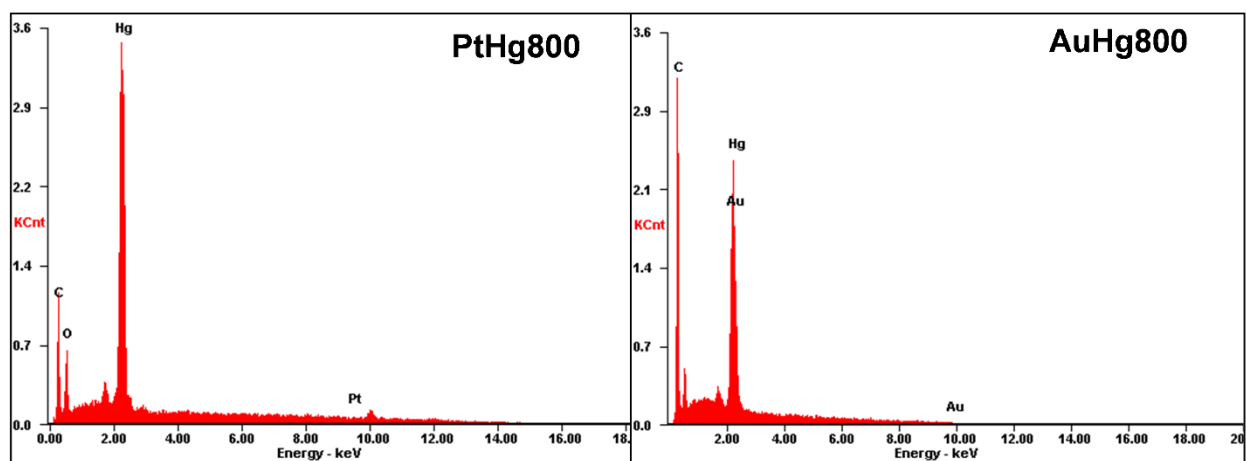


Figure S6. EDS Analysis of the prepared samples PtHg800 and AuHg800.

Table S1. EDS Analysis of the prepared samples with Hg atomic %.

Sr. No	Samples	Hg (Atomic %)
1	PdHg100	51
2	PdHg200	61
3	PdHg800	71
4	PtHg800	85
5	AuHg800	30

**Table S2.** Faradaic efficiencies of formate ion at different potentials (reproducibility of the experiments).

<b>Samples</b>	<b>-1.7</b>	<b>-1.8</b>	<b>-1.9</b>	<b>-2.0</b>	<b>-2.1</b>	<b>-2.3</b>
PdHg100	18	16	19	24	25	20
PdHg200	17	18	22	26	28	20
PdHg800	65	68	73	77	85.3	50
PtHg800	37	40	43	43.5	53.5	15
AuHg800	50	55	60	62	64	41
CuHg800	45	40	58	46	48	33