Electronic Supplementary Material (ESI) for Catalysis Science & Technology.

Supporting Information

Nanosheet assembled microspheres metal (Zn, Ni, and Cu) indium sulfide for highly selective CO_2 electroreduction to methane

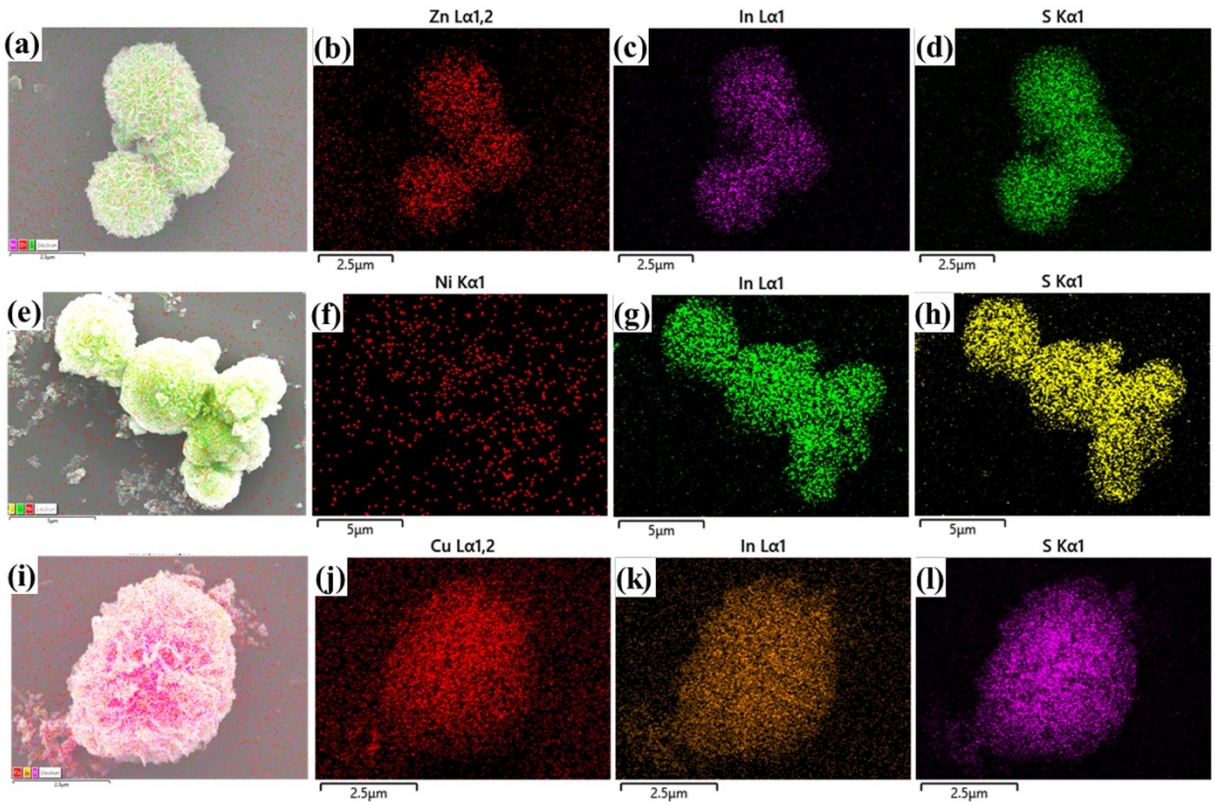

Fig. S1. FESEM elemental mapping of ZIS (a-d), NIS (e-h), and CIS (i-l).

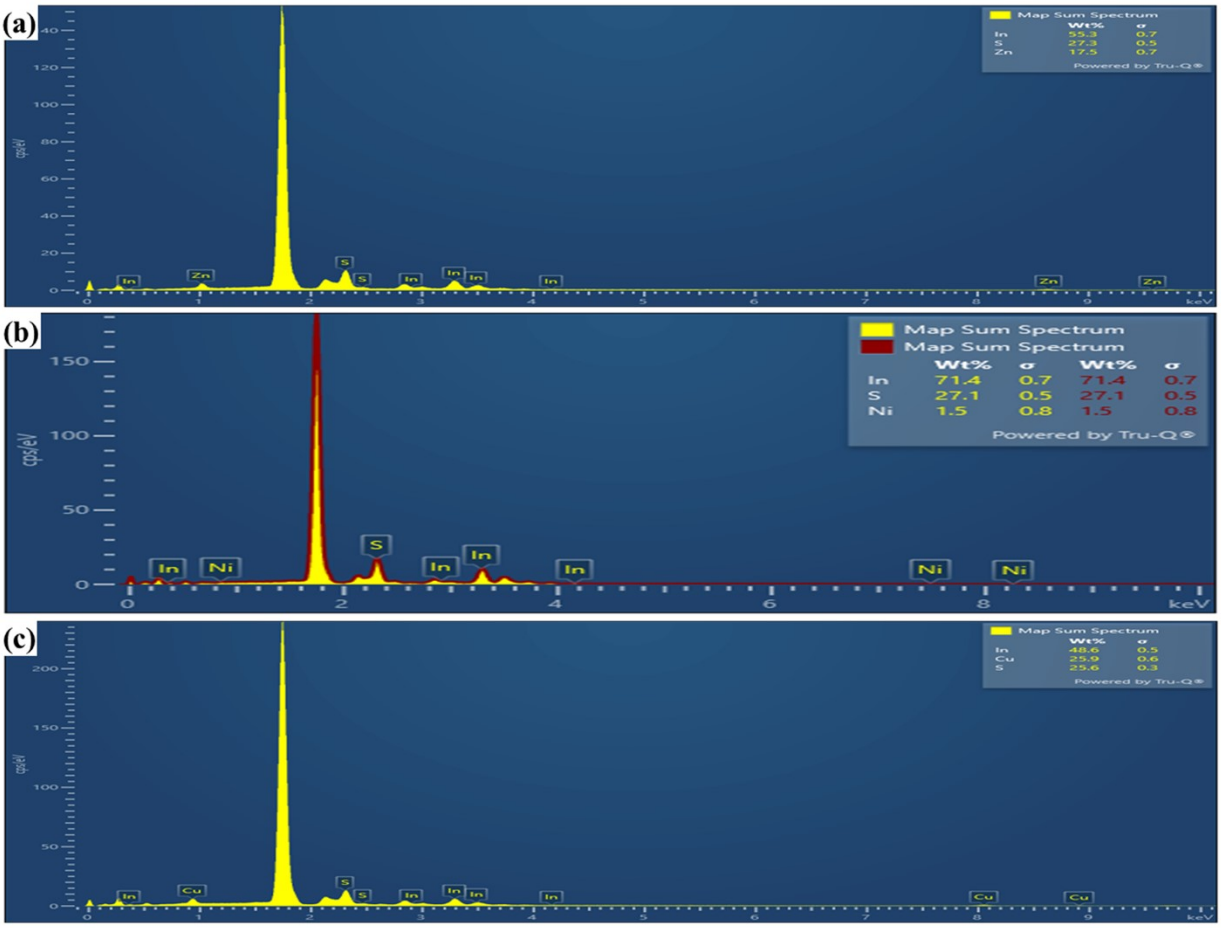

Fig. S2. EDS of samples. (a) ZIS, (b) NIS, and (c) CIS.

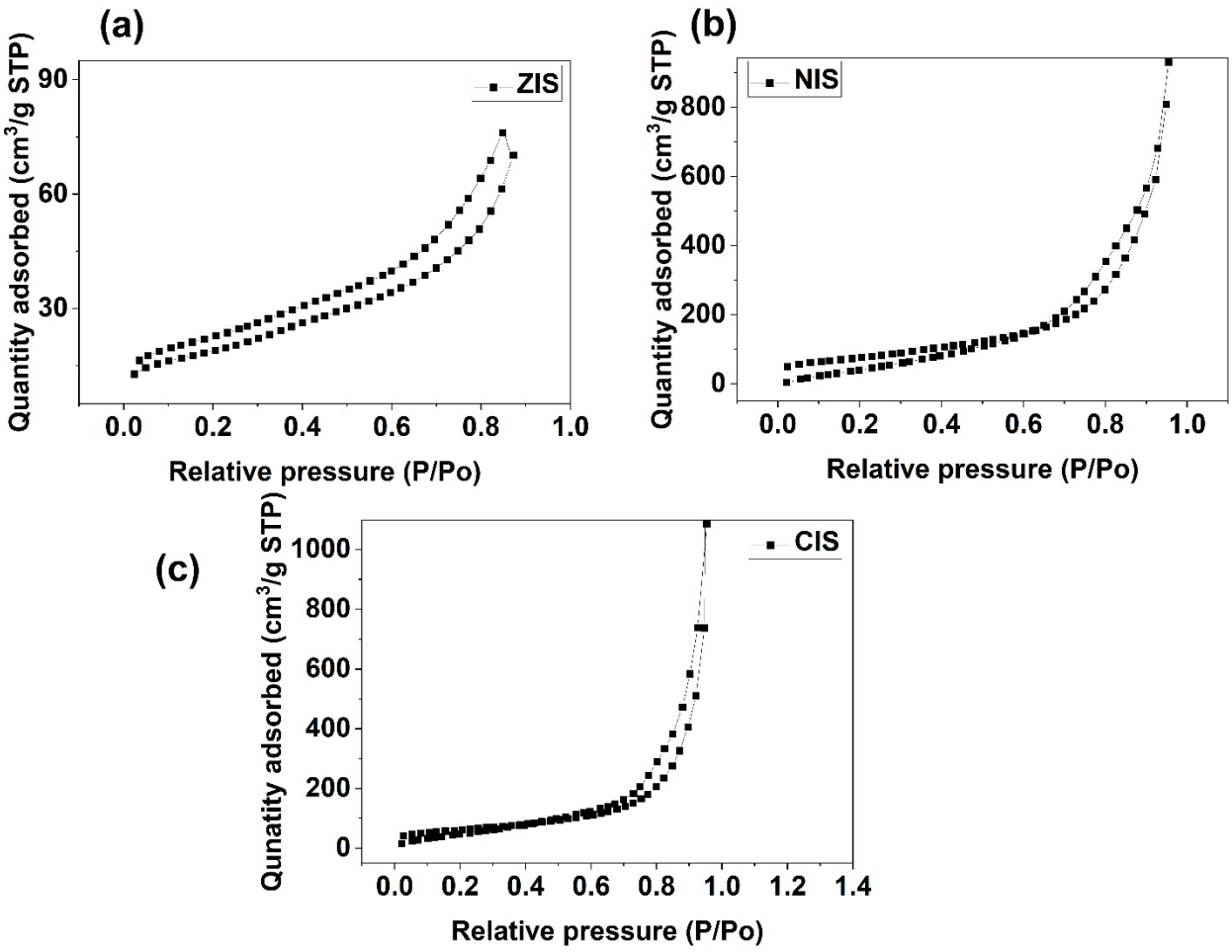

Fig. S3. BET surface area of samples. (a) ZIS, (b) NIS, and (c) CIS.

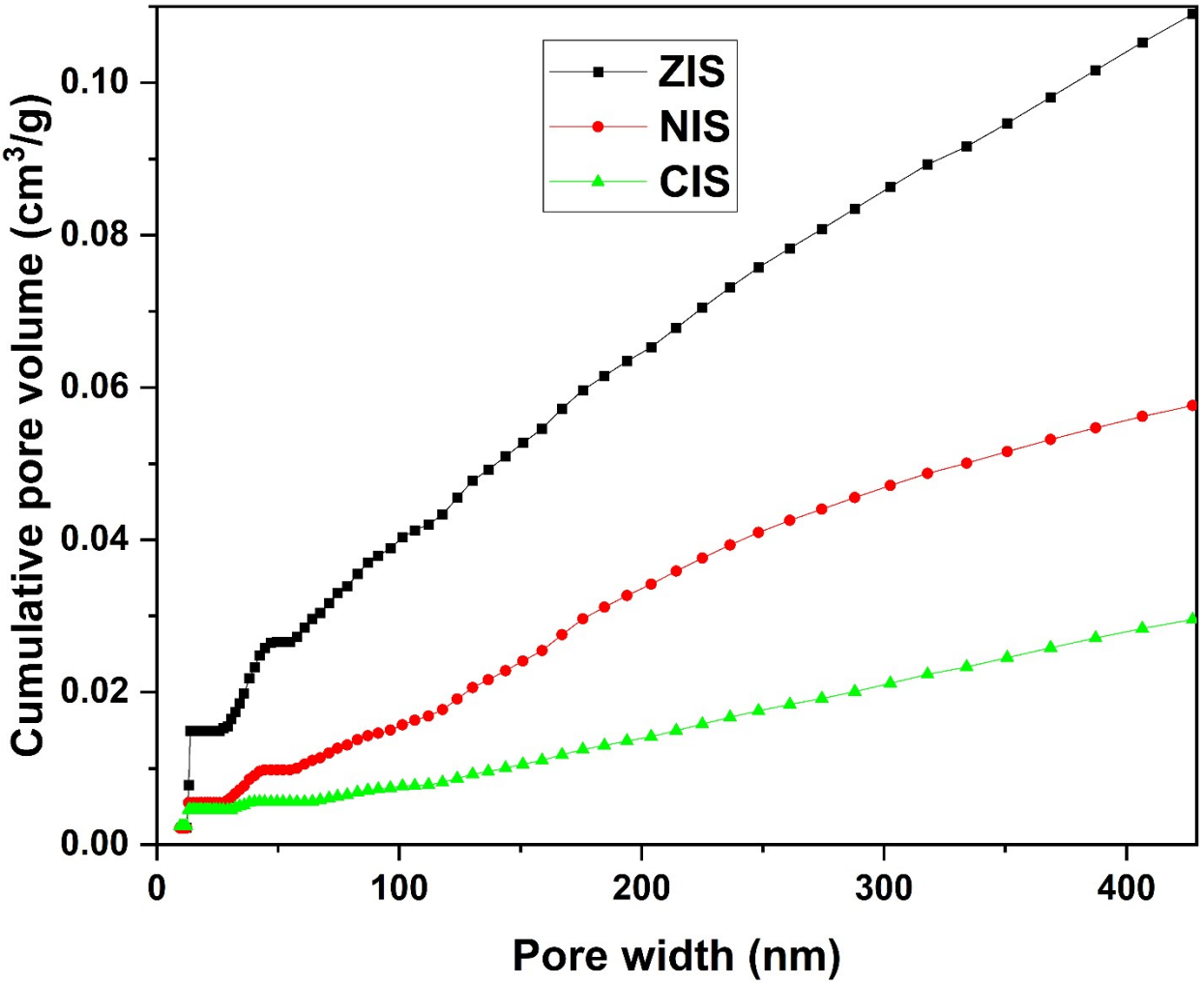

Fig. S4. Pore-size distribution of ZIS, NIS, and CIS.

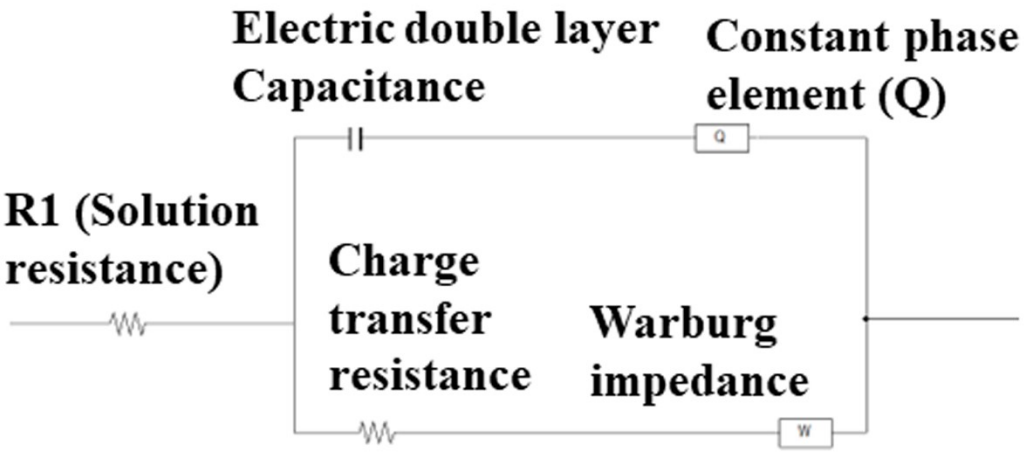

Fig. S5. Equivalent circuit of ZIS, NIS, and CIS.

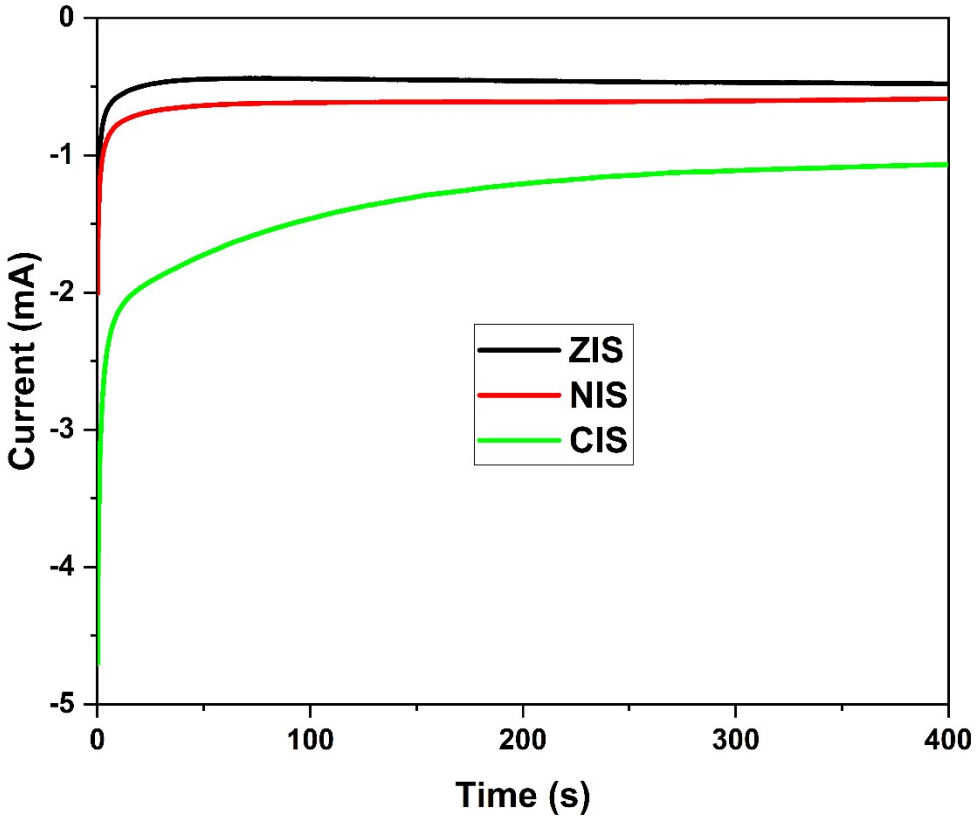

Fig. S6. Chronoamperometries curves of ZIS, NIS, and CIS.

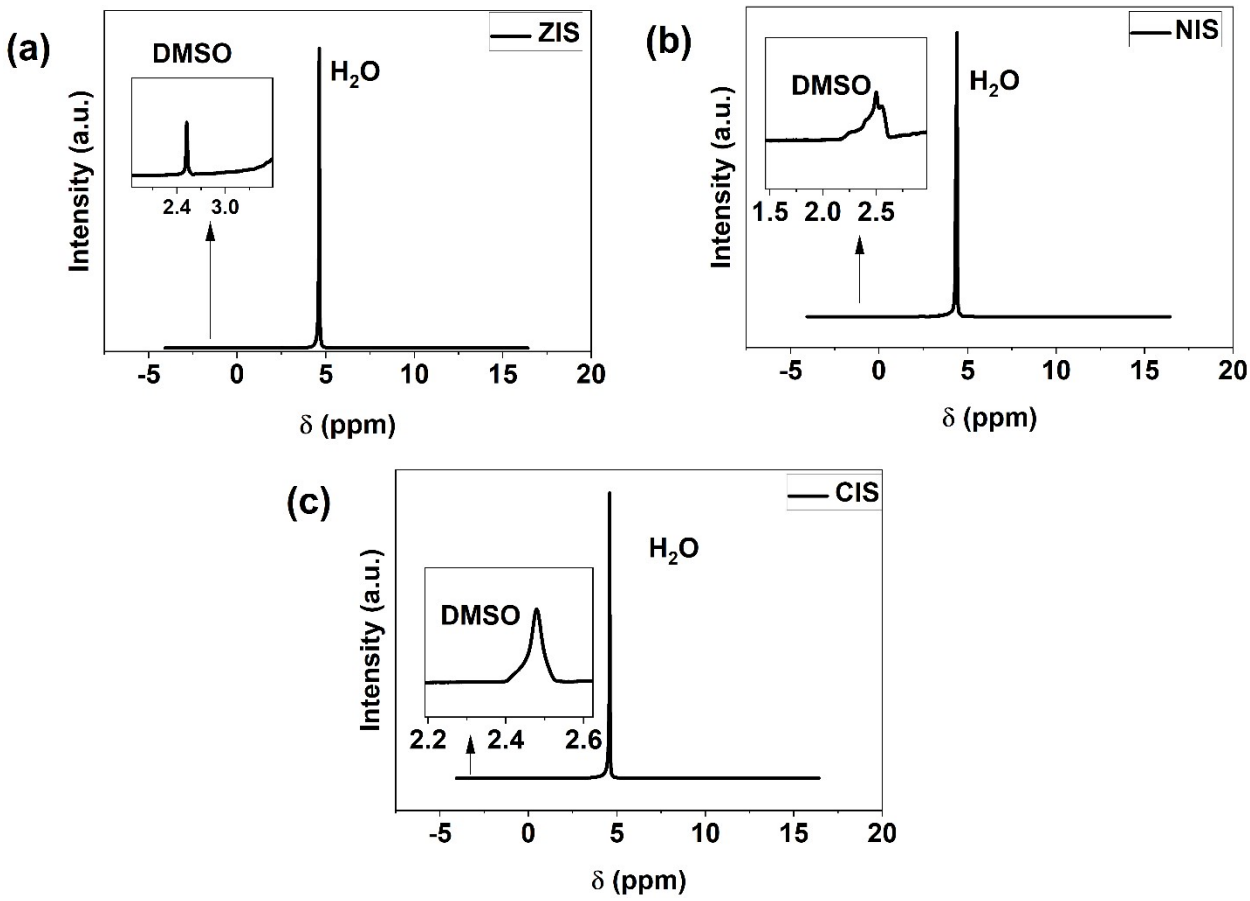

Fig. S7. ^{1}H NMR graph of samples. (a) ZIS, (b) NIS, and (c) CIS.

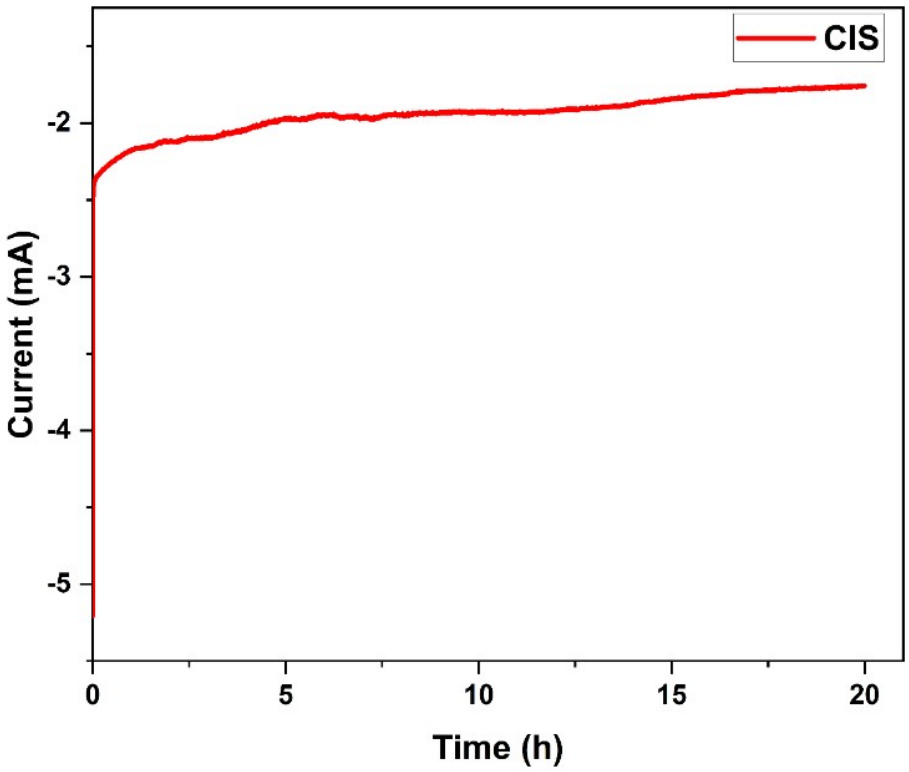

Fig. S8. Durability test of CIS for 20 h at -0.6 V vs RHE.

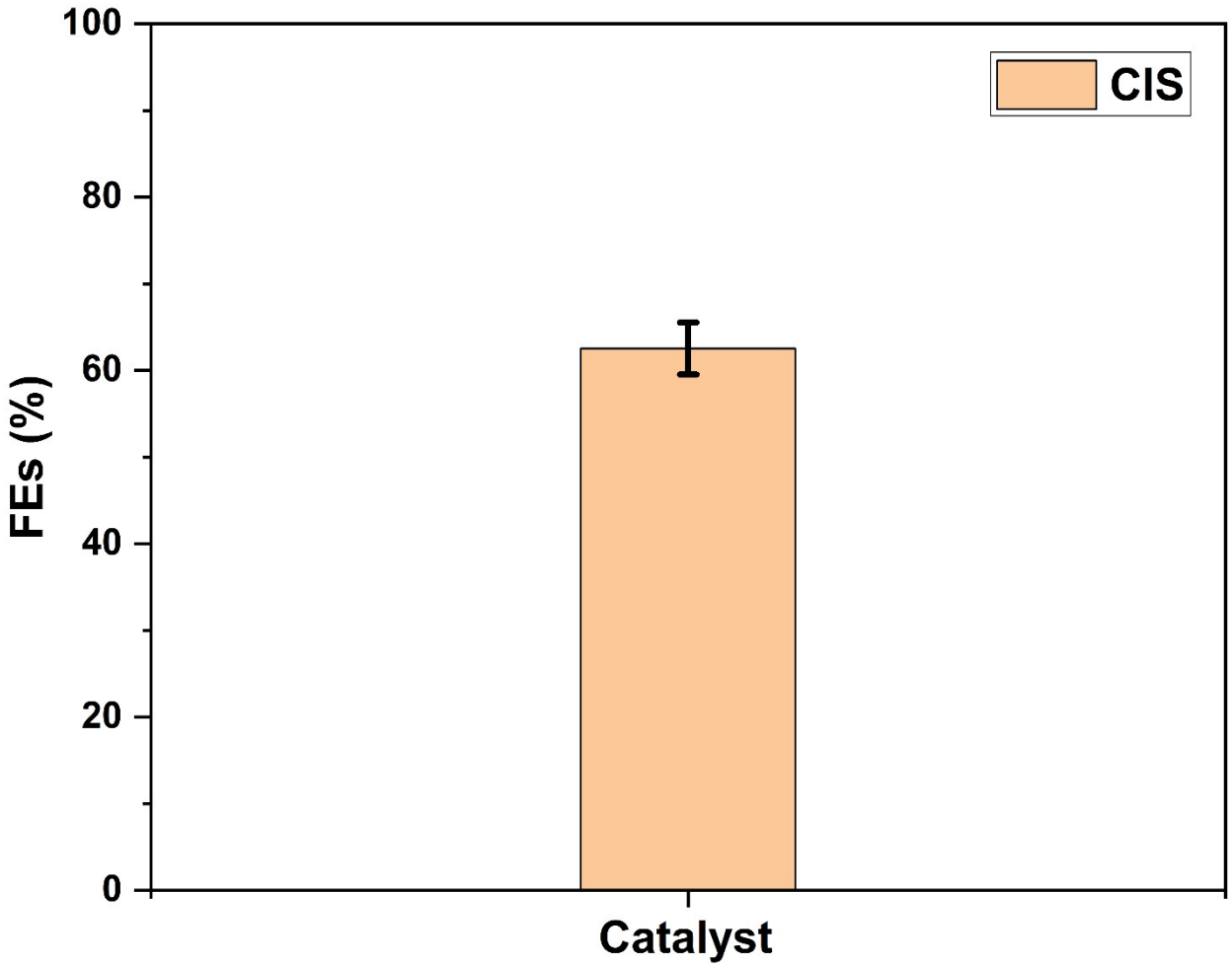

Fig. S9. FEs at -0.6 V versus RHE after durability test of CIS for 20 h at -0.6 V versus RHE.

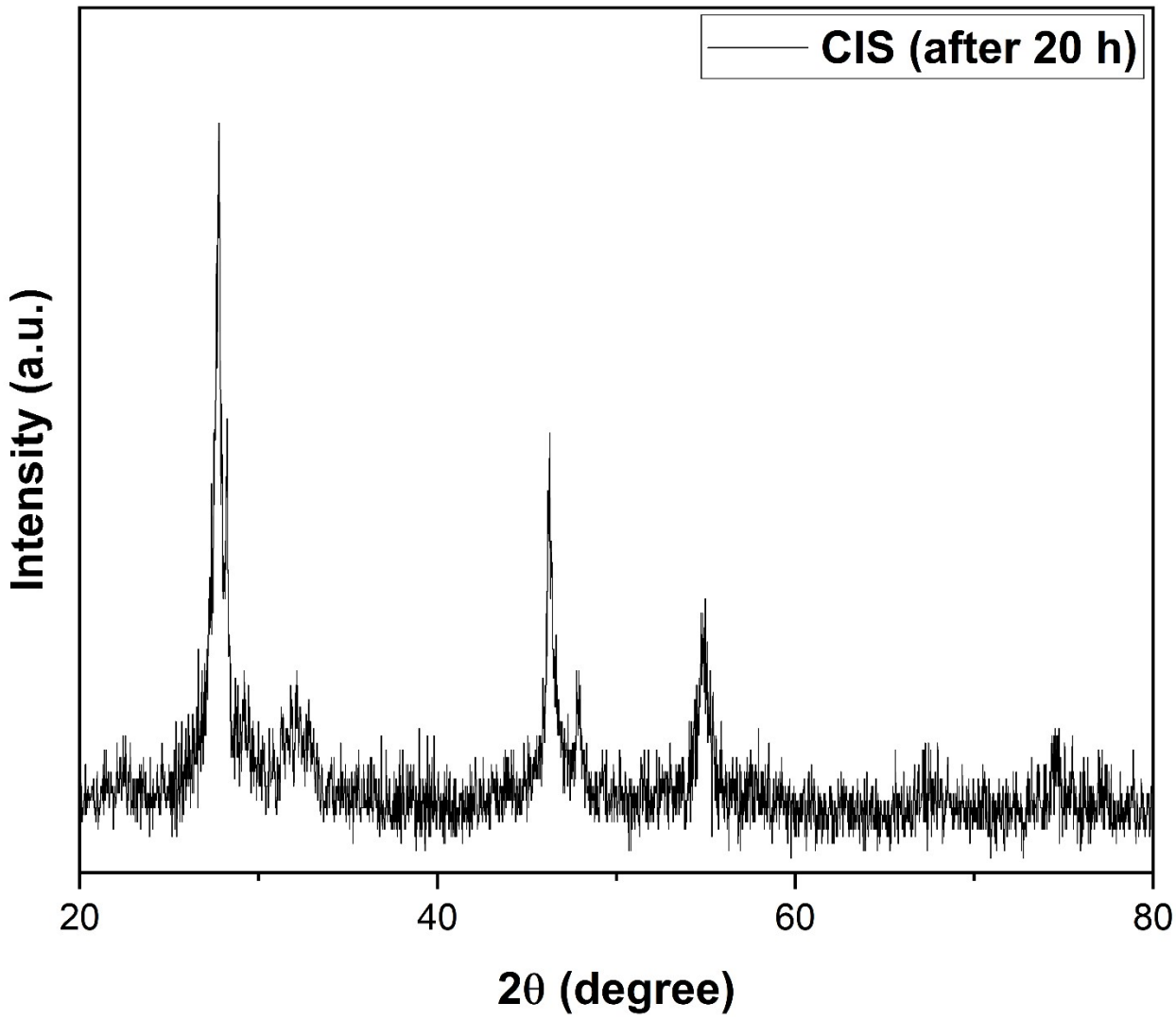

Fig. S10. XRD pattern of CIS after 20 h stability.

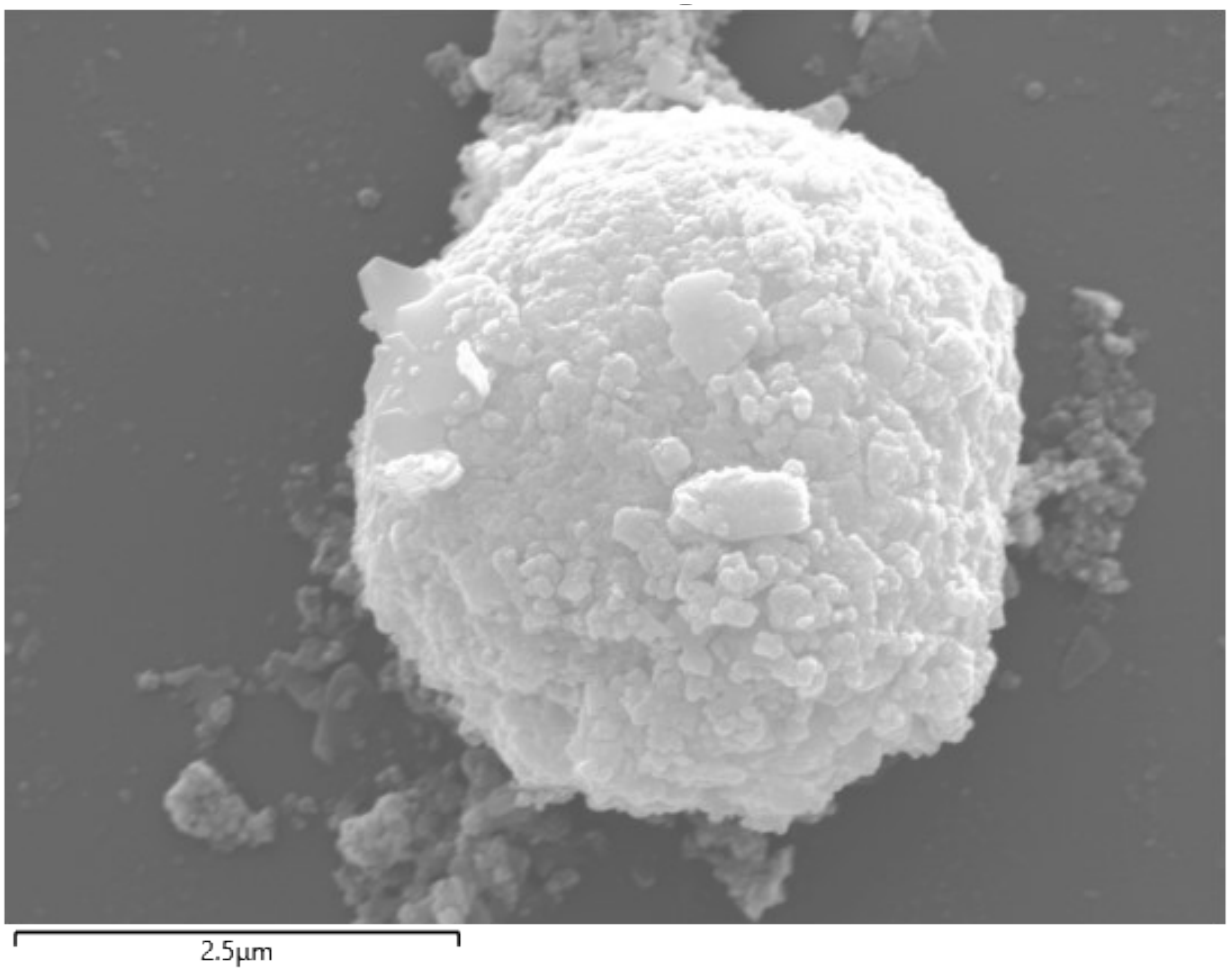

Fig. S11. FESEM image of CIS after 20 h stability.

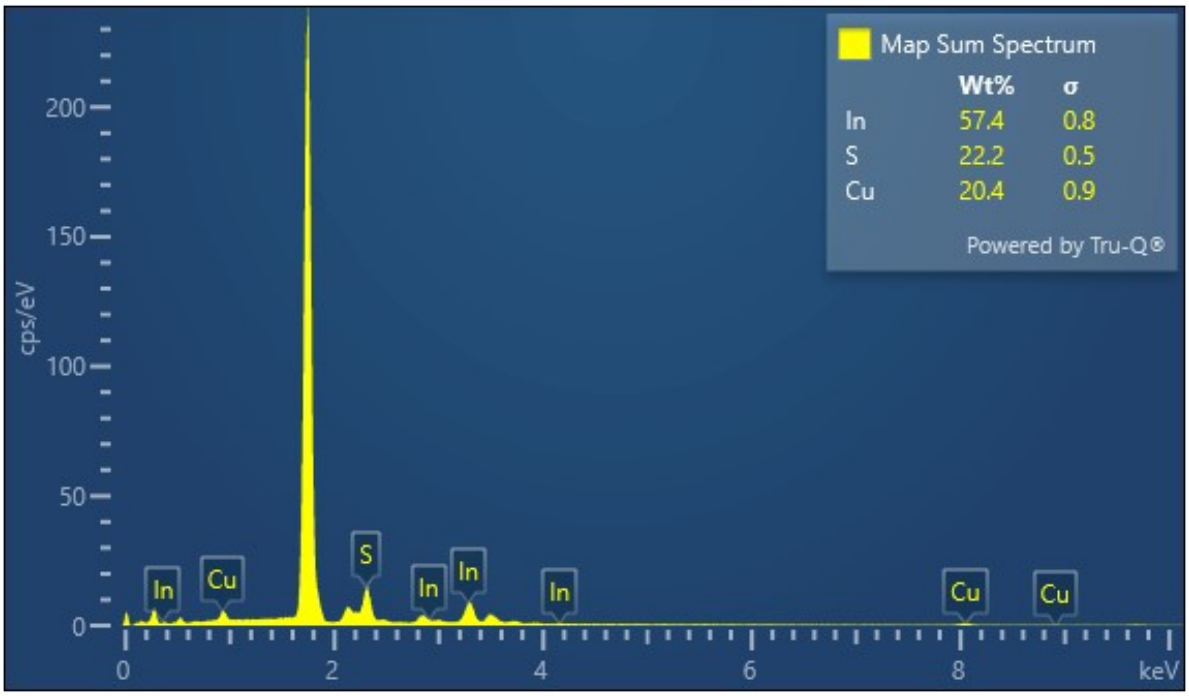

Fig. S12. EDS of CIS after 20 h stability.

Table S1. Equivalent series resistance values of ZIS, NIS, and CIS electrocatalysts obtained from the EIS analysis.

Samples	**R1 (Solution resistance) Ω**	**Warburg impedance coefficient (σ)**	**R2 (Charge transfer resistance) Ω**	**Q (Constant phase element)**	**Electric double layer Capacitance (F)**
ZIS	37.41	0.00002704	2347	0.002847	0.00003614
NIS	35.64	0.000012	2157	0.003011	0.00002851
CIS	49.25	0.0007006	1306	0.002768	0.00002831

Table S2. Data obtained from GC during the electrochemical reduction of CO_2 at -0.6 V (V vs. RHE) using ZIS, NIS, and CIS.

Samples	**Concentration of CH_4 (ppm)**	**Current (mA)**	**FEs**
ZIS (400 s)	89.79	0.455	67.78
NIS (400 s)	89.16	0.75	75.31
CIS (400 s)	124.72	1.69	80.11
CIS (20 h)	97.33	1.69	62.53