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Supporting information

Facile synthesis of cubic cuprous oxide for electrochemical reduction of carbon dioxide

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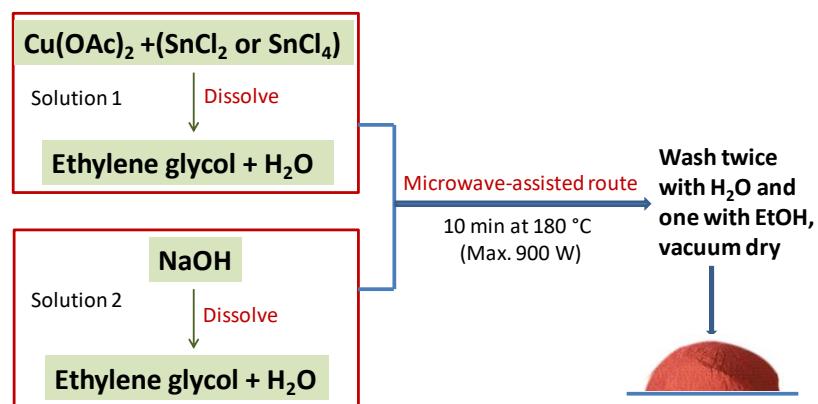
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Keywords: Carbon dioxide; cuprous oxide; syngas; particle size; restructuring

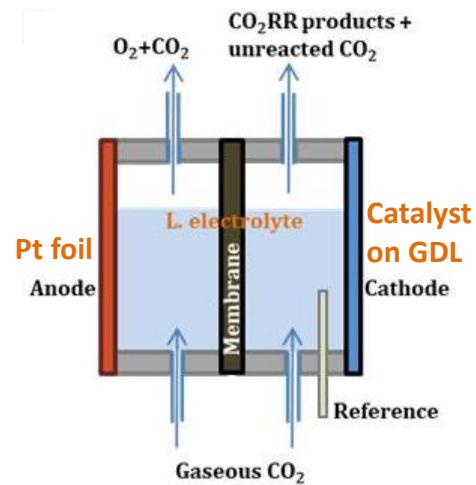
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Scheme of a microwave-assisted solvothermal route for preparing copper-based catalysts



Scheme S1 A microwave-assisted solvothermal route for preparing copper-based catalysts.



Scheme S2 Scheme of a three-electrode two-compartment cell.

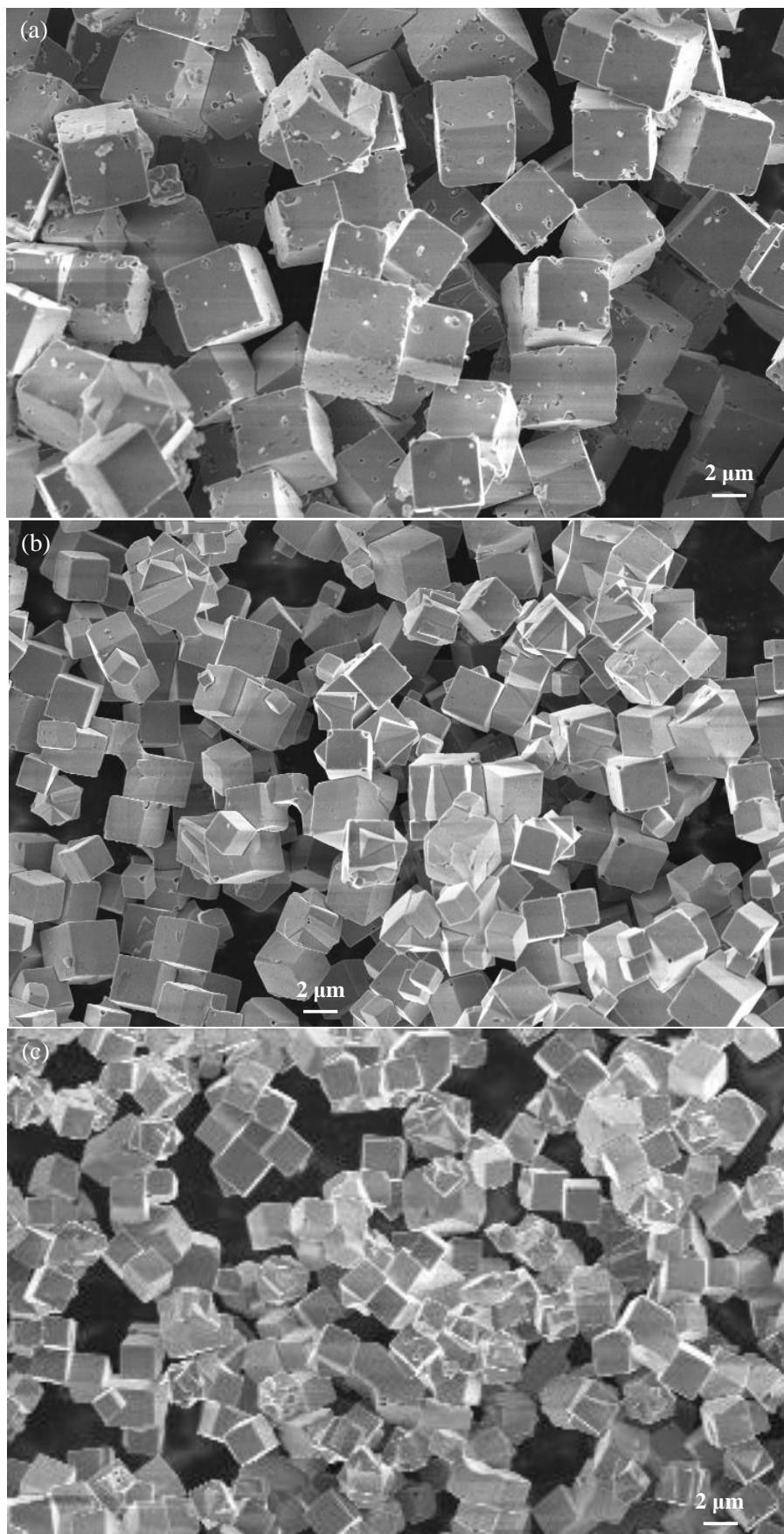


Fig. S1 FESEM images at low magnifications of Cu-based catalysts: (a) Cu(II); (b) Cu(II)Sn(IV)5; (c) Cu(II)Sn(IV)10.

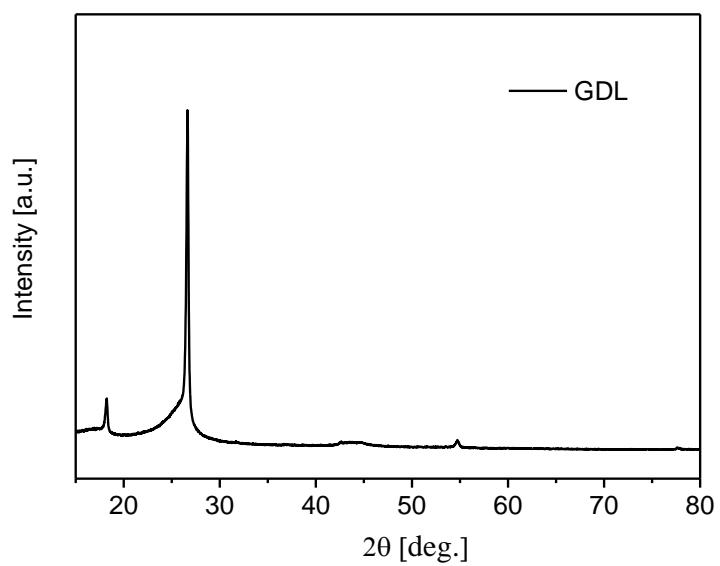


Fig. S2 XRD pattern of GDL substrate.

Detailed chronoamperometric measurements at various potentials and analyses of products on Cu(II) electrodes.

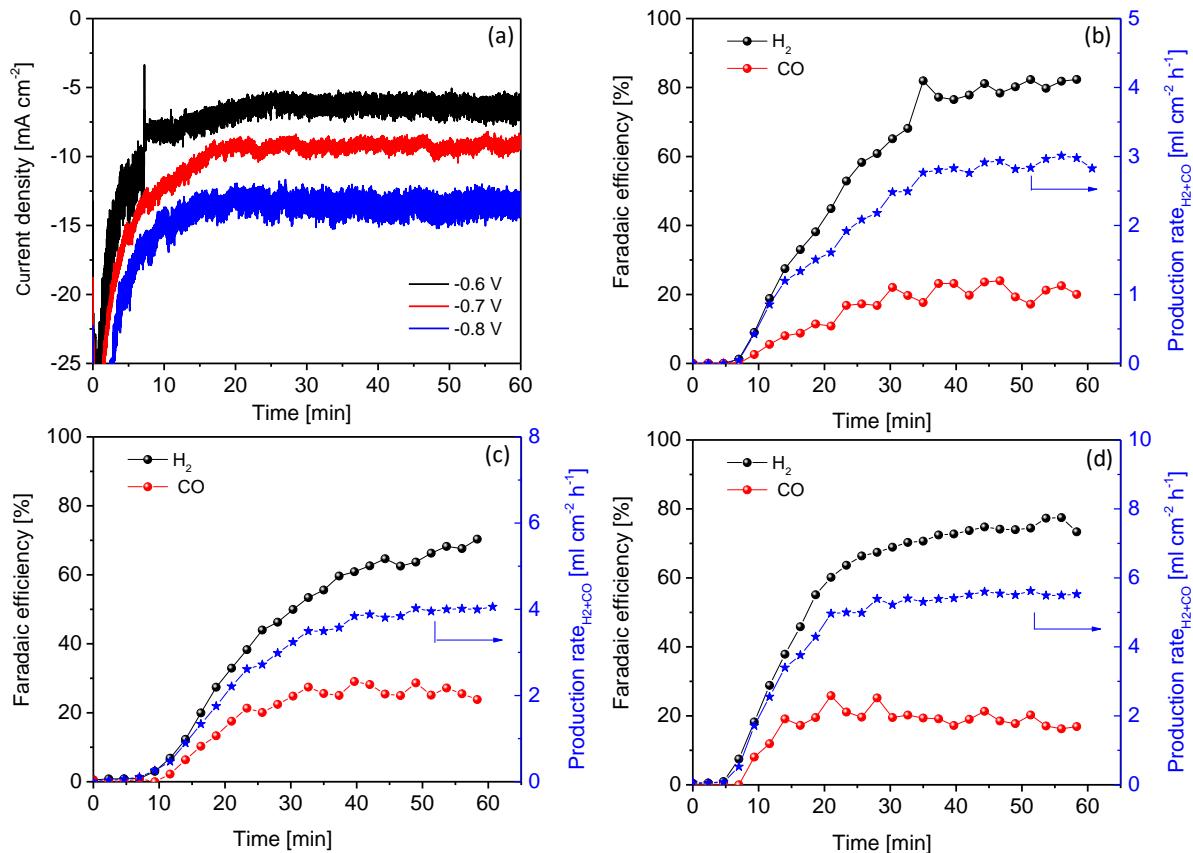


Fig. S3 CA measurements on the Cu(II) electrodes in CO₂-saturated 0.1 M KHCO₃ aqueous solutions at various potentials (a). The FE values of H₂ and CO and the production rate of syngas at various potentials: (b) -0.6 V; (c) -0.7 V; (d) -0.8 V.

Detailed chronoamperometric measurements at various potentials and analyses of products

on Cu(II)Sn(II)5 electrodes.

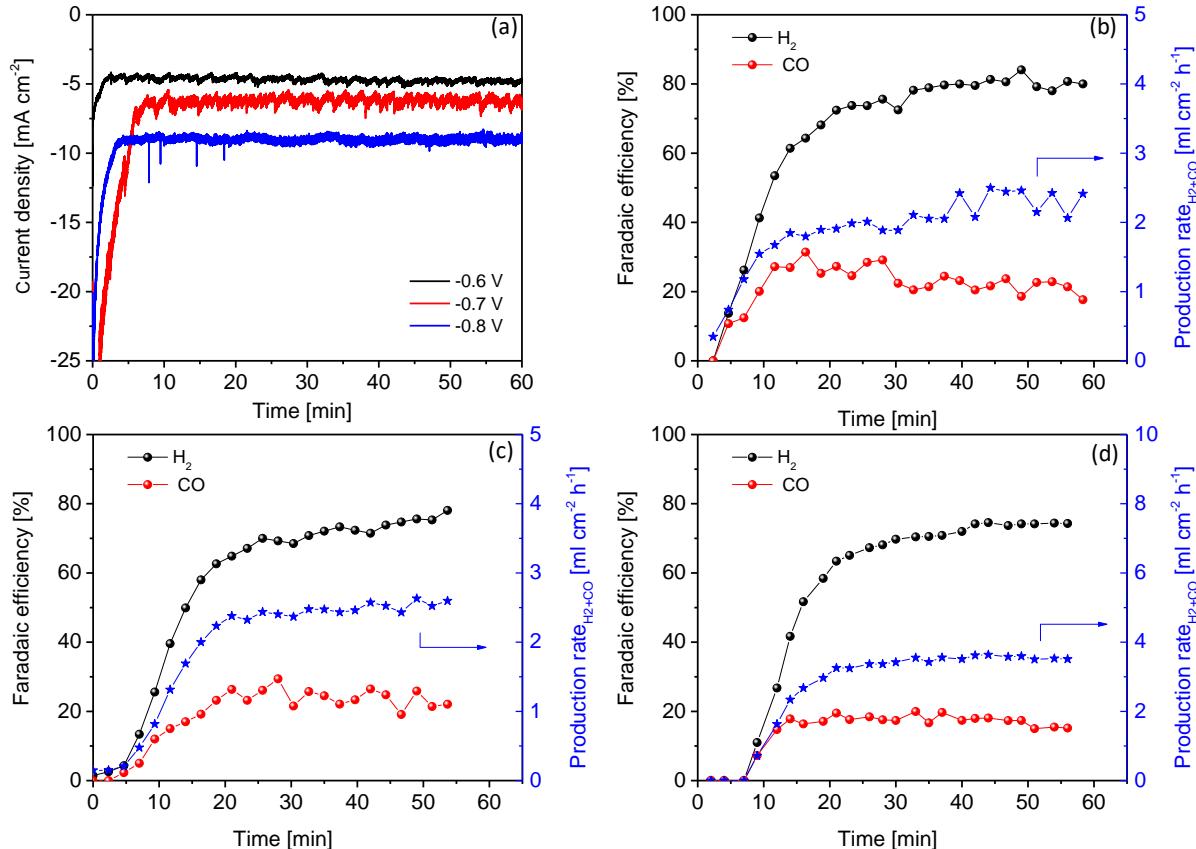


Fig. S4 CA measurements on the Cu(II)Sn(II)5 electrodes in CO₂-saturated 0.1 M KHCO₃ aqueous solutions at various potentials (a). The FE values of H₂ and CO and the production rate of syngas at various potentials: (b) -0.6 V; (c) -0.7 V; (d) -0.8 V.

Detailed chronoamperometric measurements at various potentials and analyses of products on Cu(II)Sn(IV)5 electrodes.

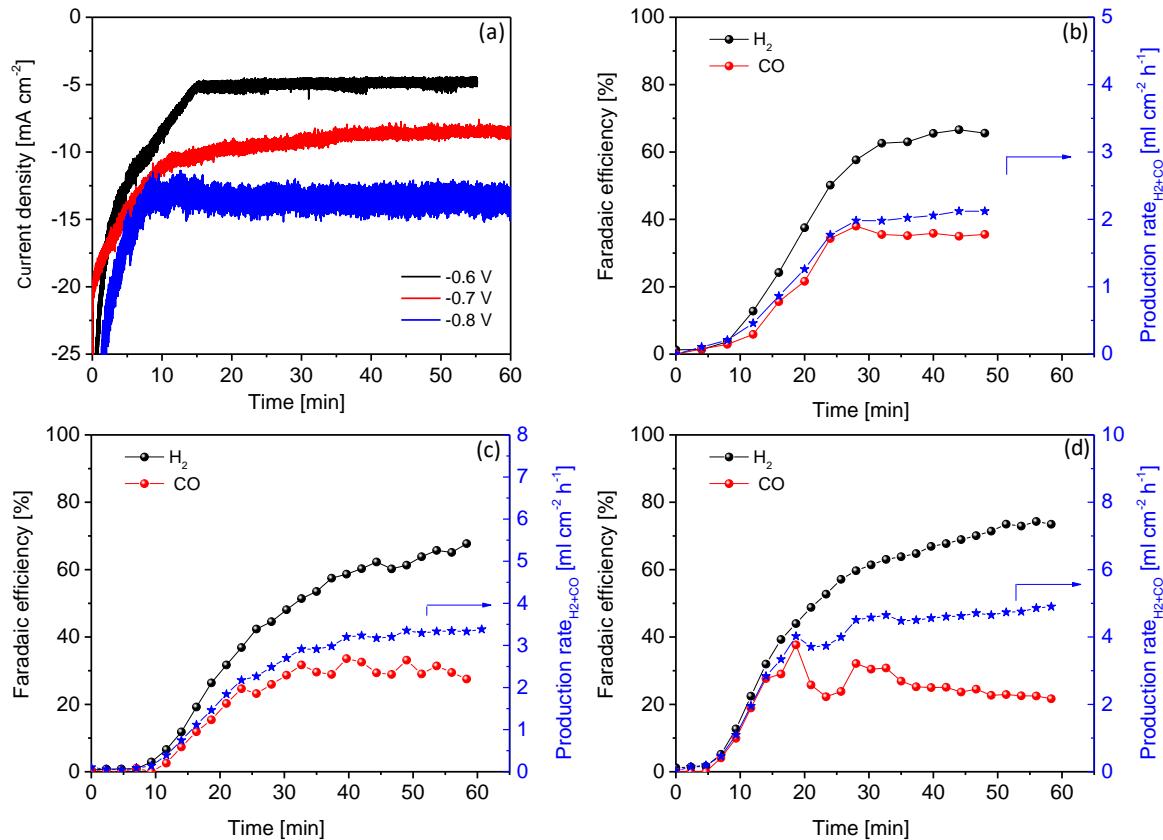


Fig. S5 CA measurements on the Cu(II)Sn(IV)5 electrodes in CO₂-saturated 0.1 M KHCO₃ aqueous solutions at various potentials (a). The FE values of H₂ and CO and the production rate of syngas at various potentials: (b) -0.6 V; (c) -0.7 V; (d) -0.8 V.

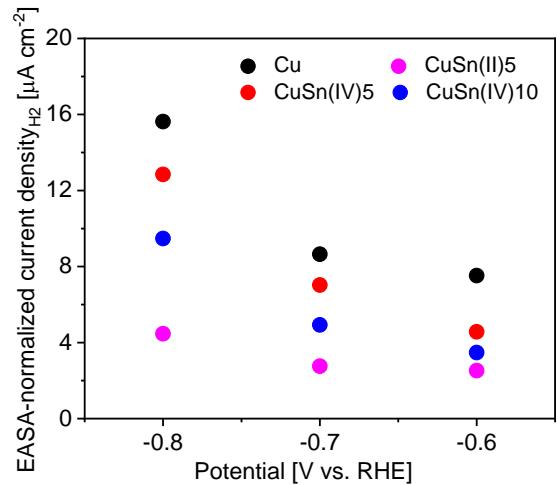


Fig. S6 The current density normalized by the EASA for H₂ formation at various electrodes.

Table S1 Relative atomic concentration (at.%) of Cu and Sn obtained from HR.

| Samples | Cu | Sn | Cu/Sn |
|-----------------------|------|-------|------------|
| Cu(II) | 25.0 | - | - |
| Cu(II)Sn(II)5 | 60.7 | < 0.1 | < 99.8/0.2 |
| Cu(II)Sn(IV)5 | 23.6 | 0.2 | 99.1/0.9 |
| Cu(II)Sn(IV)10 | 26.2 | 0.2 | 99.3/0.7 |