Supporting materials

Silver-Carbonaceous Microsphere Precursor-Derived Nano-Coral Ag Catalyst for Electrochemical Carbon Dioxide Reduction

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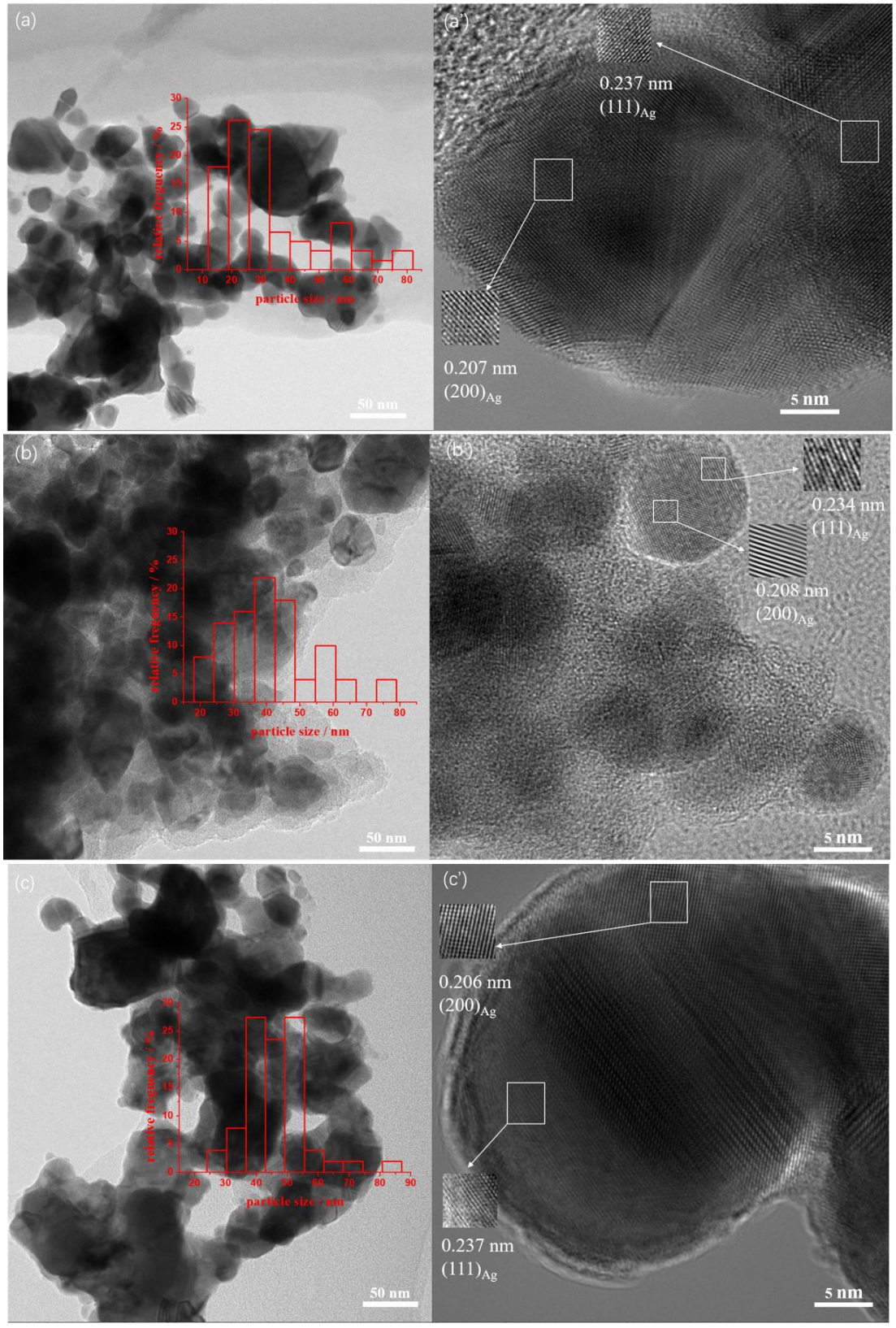

Figure S1. TEM image and the statistics of particle size distribution in inset (**a, b, c**) and HR-TEM (**a′, b′, c′**) of different sample 10CD-Ag, 15CD-Ag and 20CD-Ag, respectively.

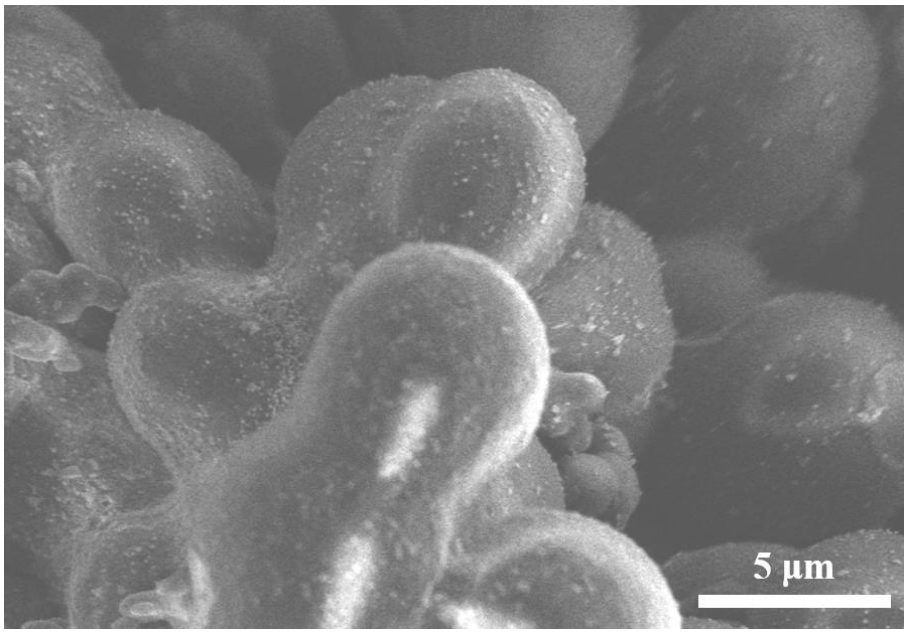

Figure S2. SEM image of the representative sample 15Ag/CM precursor.

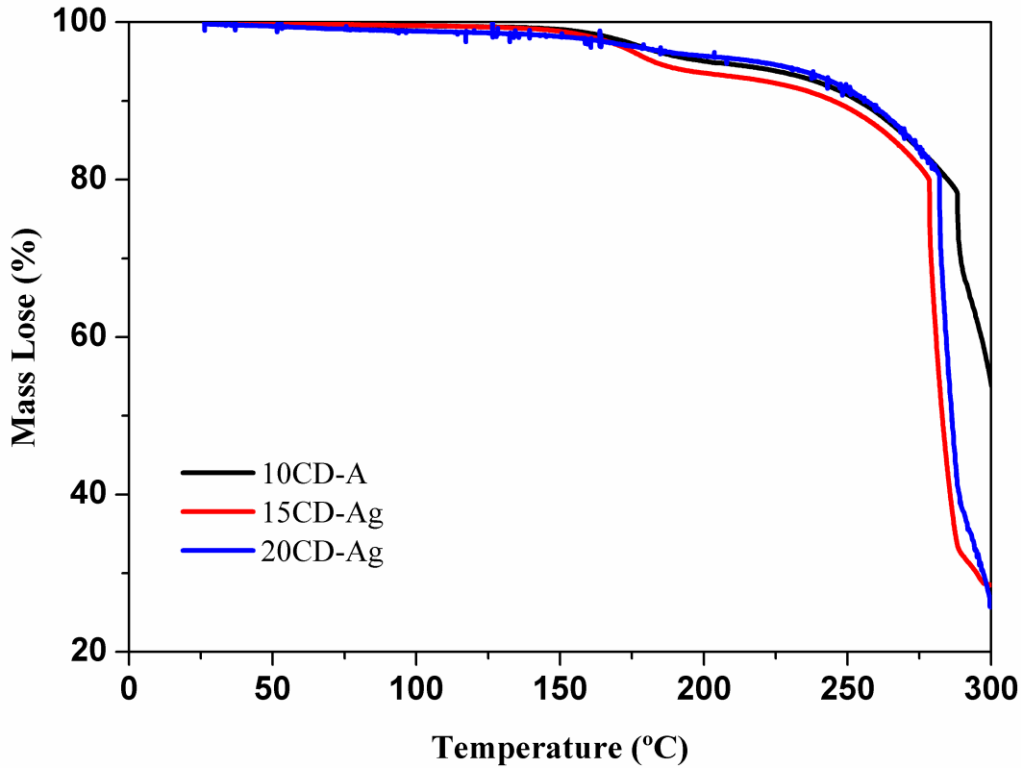

Figure S3. Thermogravimetric analysis (TG) profiles for the Ag/CM precursors during the calcination process.

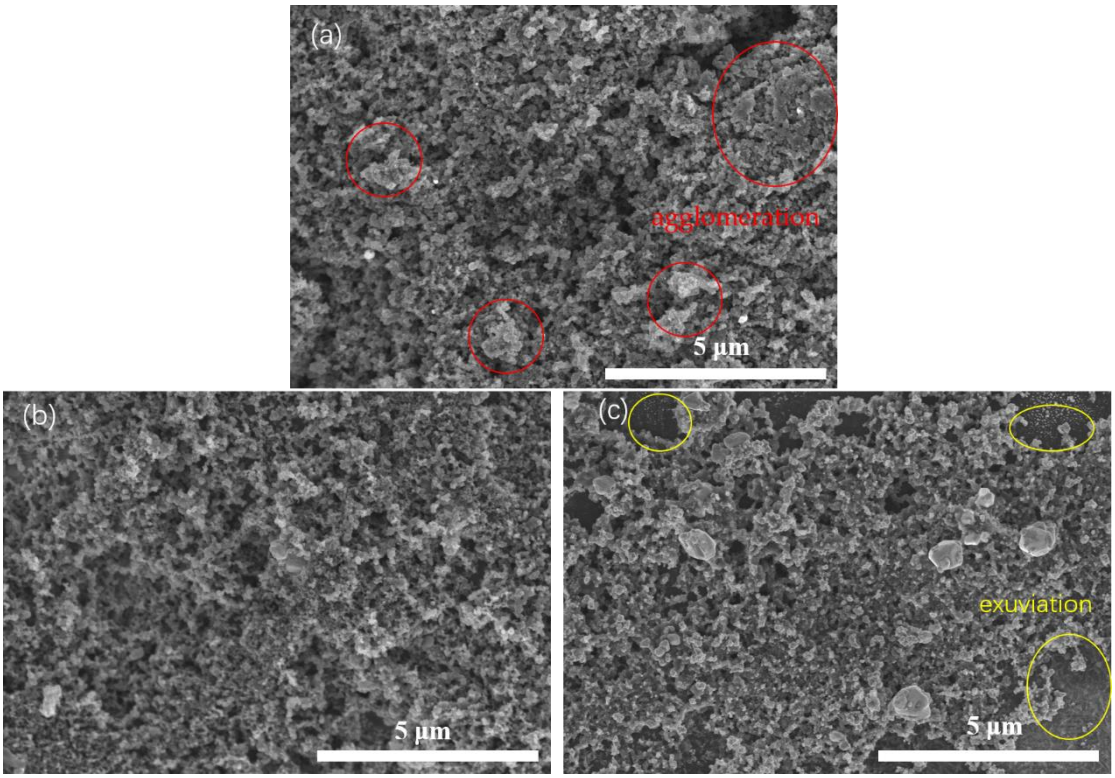

Figure S4. SEM images of different CD-Ag electrodes after 5 h electrolysis: (**a**) 10CD-Ag; (**b**) 15CD-Ag and (**c**)20CD-Ag, respectively.

Table S1. The elemental compositions of three CD-Ag samples obtained from EDS.

Elemental Compositions (wt%)	Sample		
	10CD-Ag	**15CD-Ag**	**20CD-Ag**
Ag	98.7	97.6	96.3
C	0.6	1.4	2.7
O	0.7	1.0	1.0

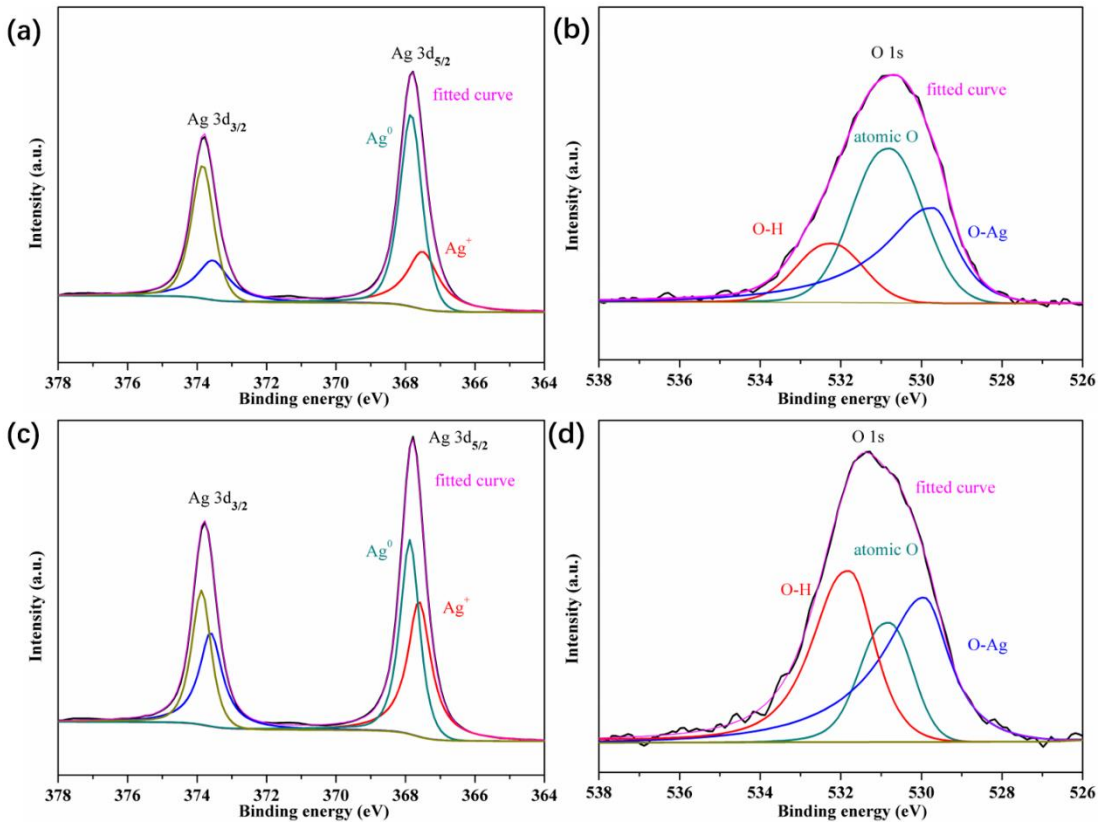

Figure S5. The deconvoluted peak of (**a**) Ag 3d and (**b**) O 1s of 10CD-Ag material and (**c**) Ag 3d and (**d**) O 1s of 20CD-Ag material.

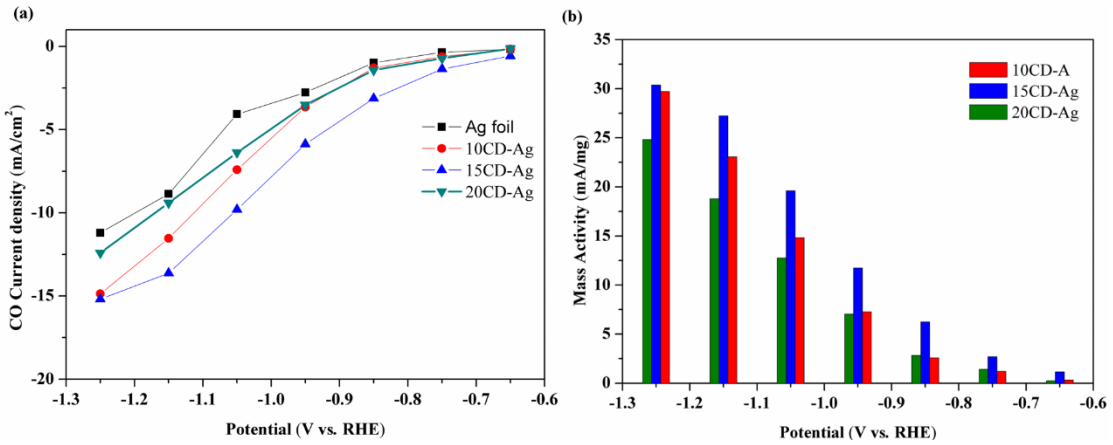

Figure S6. (a) CO partial current density depending on applied potential, and (b) mass activity depending on applied potential.

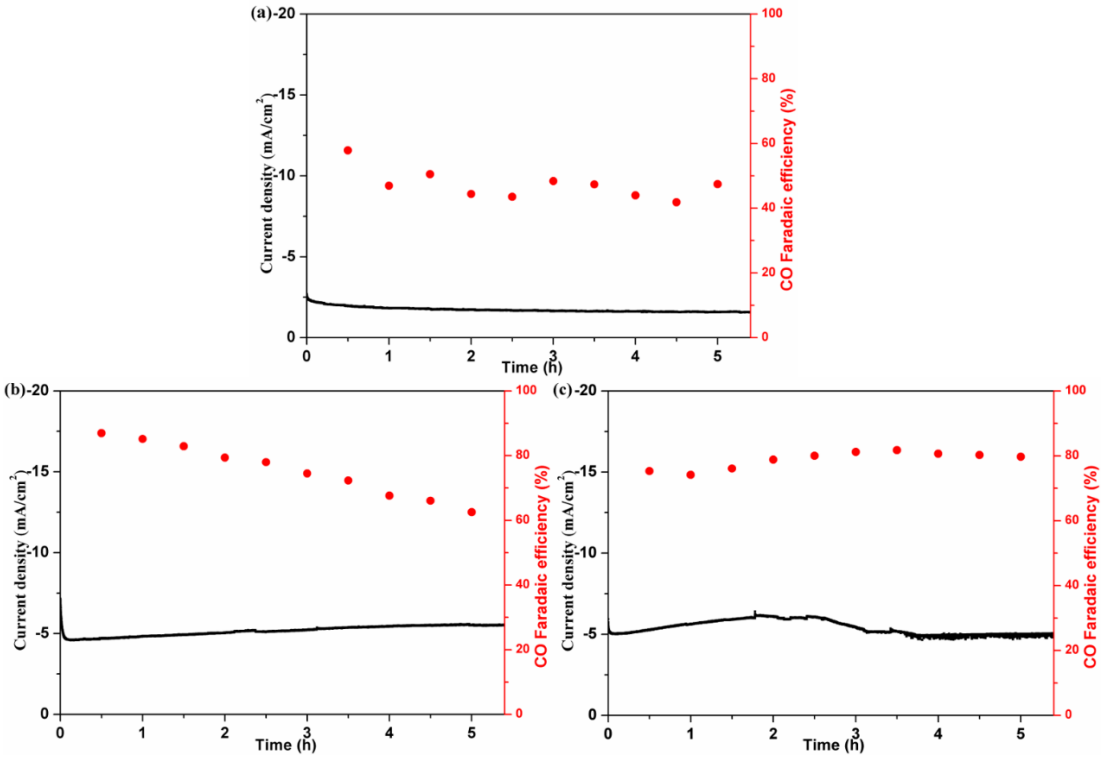

Figure S7. Current density and FE of CO during 5 h of long-time operation at -0.95 V vs. RHE for (**a**) Ag foil; (**b**) 10CD-Ag; (**c**) 20CD-Ag electrode, respectively.

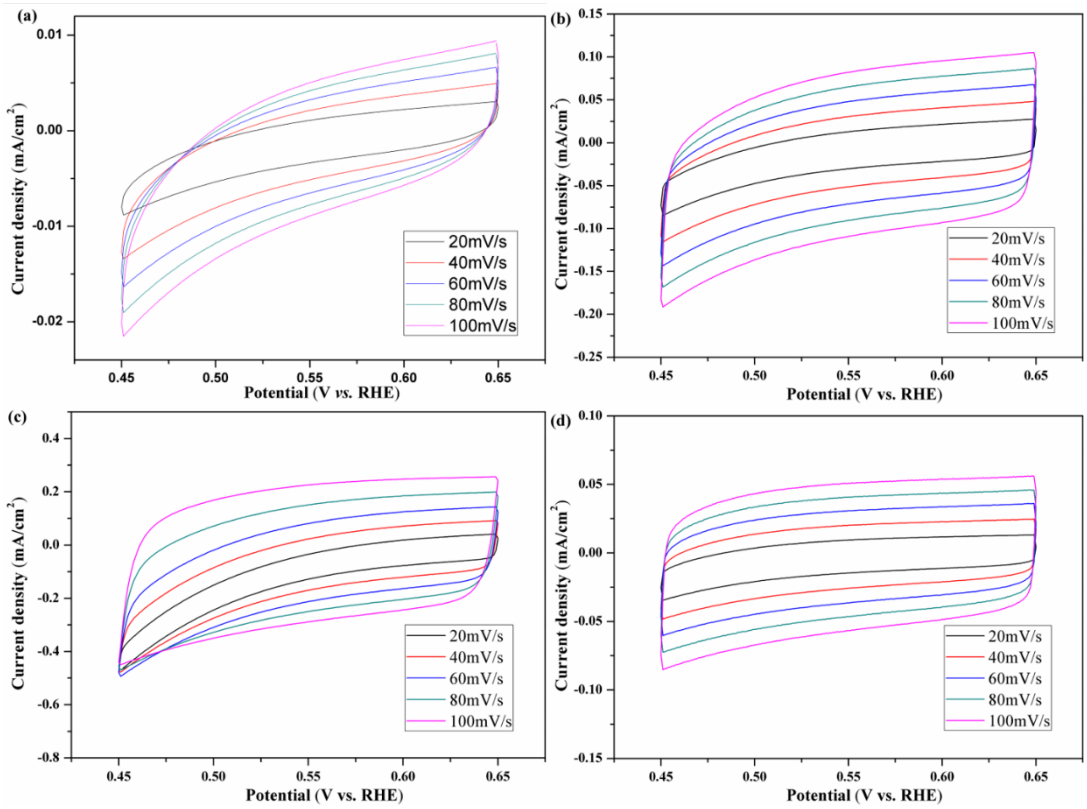

Figure S8. CV curves on (**a**) Ag foil; (**b**) 10CD-Ag; (**c**) 15CD-Ag; (**d**) 20CD-Ag electrode with a potential range from 0. 65 to 0.45 V vs. RHE in a CO_2 bubbled 0.1 M $KHCO_3$ electrolyte.

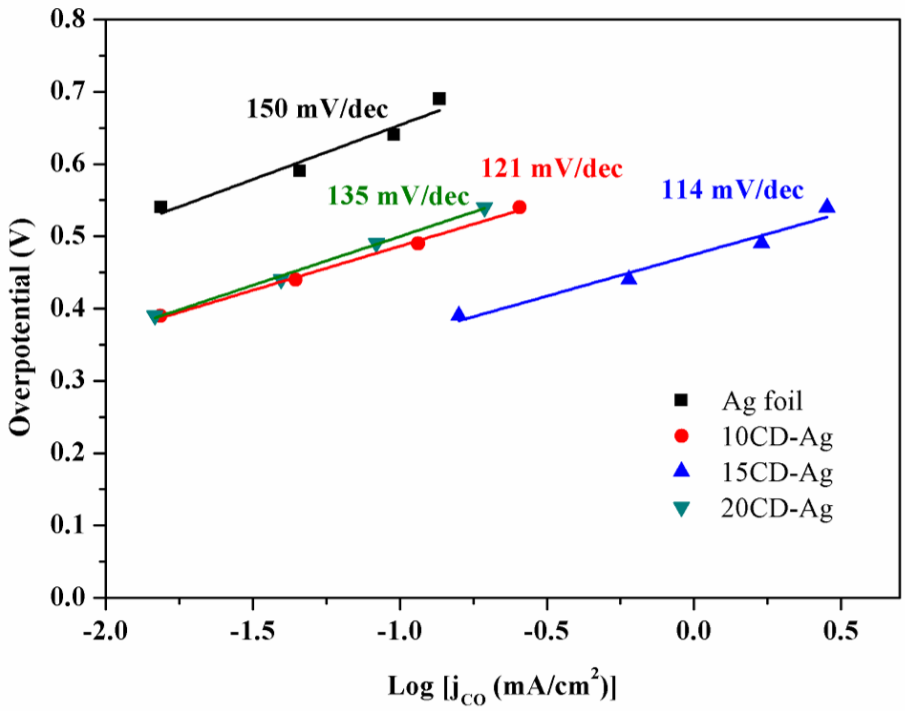

Figure S9. Tafel plots of the CO partial current density for Ag foil and CD-Ag.

Table S2. Comparison of catalytic performances of our catalyst with different Ag-based electrocatalysts producing CO in literatures.

Catalyst	Electrolyte	Applied Potential (V vs. RHE)	Current Density (mA cm^{-2})	Faradaic Efficiency (%)	Stability (h)	Ref
OD Ag	0.1 M $KHCO_3$	−0.80	1.15	89	2	[23]
Ag nano-corals	0.1 M $KHCO_3$	−0.60	2	95	72	[25]
AE-Ag	0.1 M $KHCO_3$	−0.55	1	90	37	[44]
Ag Nanowires	0.5 M $KHCO_3$	−0.90	7.1	78	12	[27]
Hollow porous Ag	0.5 M $NaHCO_3$	−0.845	3	94	10	[40]
Tri-Ag-NPs	0.1 M $KHCO_3$	−0.856	1.25	96	14	[45]
Air-Ag	0.1 M $KHCO_3$	−0.86	13.2	80	2.7	[33]
H-Ag	0.1 M $KHCO_3$	−0.93	4.92	89.4	4	[41]
15CD-Ag	0.1 M $KHCO_3$	−0.95	6.3	89.7	5	This work
15CD-Ag	0.1 M $KHCO_3$	−1.15	14.4	94.9	/	This work