Supporting Information

Effects of Ag Nanoparticle Coated Metal Electrodes on Electrochemical CO_2 Reduction in Aqueous $KHCO_3$

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- Time-dependent potentials (vs. Ag/AgCl (3 mol/dm^3 NaCl aqueous solution)) and faradaic efficiencies (FEs) of gas products and liquid products.
- Cyclic voltammograms of pure metals (four cycles).
- Cyclic voltammograms of Ag-nanoparticle spray-coated metals (four cycles).

The areas of the Ag, Cu, Sn, Ti, and Zn cathodes were 5.18 cm^2 and that for Au was 4.51 cm^2.

S1. Time-dependent potentials (vs. Ag/AgCl (3 mol/dm^3 NaCl aqueous solution)) and faradaic efficiencies (FEs) of the gas products and selected liquid products

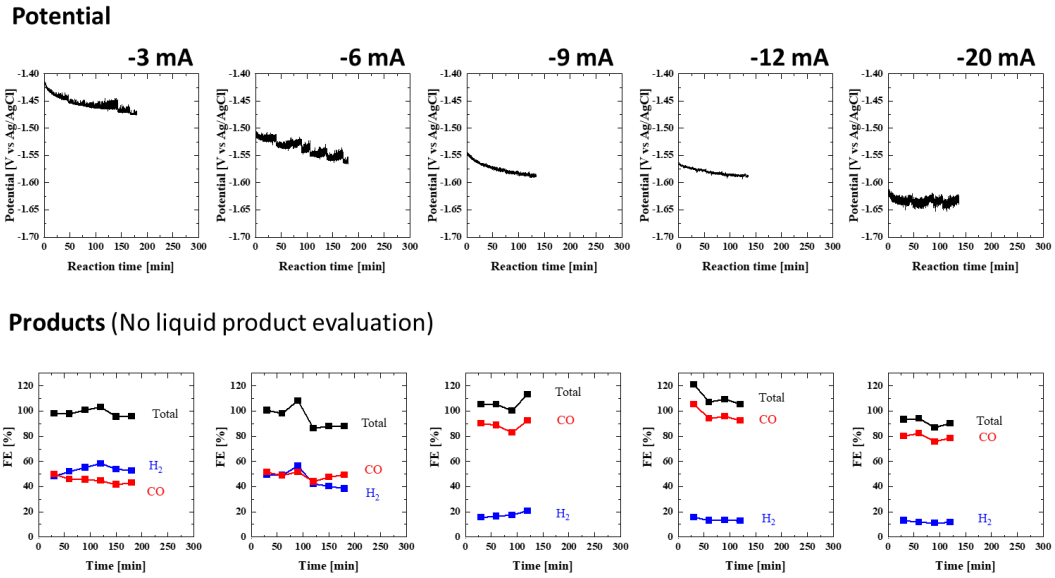

Fig. S1-1 Time-dependent potentials (vs. Ag/AgCl (3 mol/dm^3 NaCl aqueous solution)) and faradaic efficiencies (FEs) of the gas products for the Ag electrode at applied currents of (from left to right) –3, –6, –9, –12, and –20 mA.

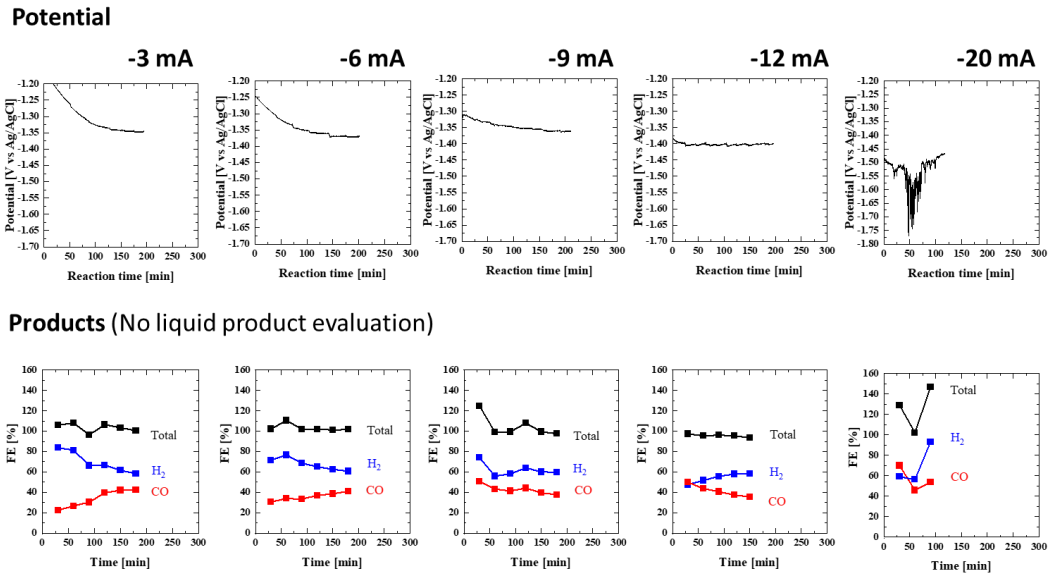

Fig. S1-2 Time-dependent potentials (vs. Ag/AgCl (3 mol/dm^3 NaCl aqueous solution)) and faradaic efficiencies (FEs) of the gas products for the Au electrode at applied currents of (from left to right) –3, –6, –9, –12, and –20 mA.

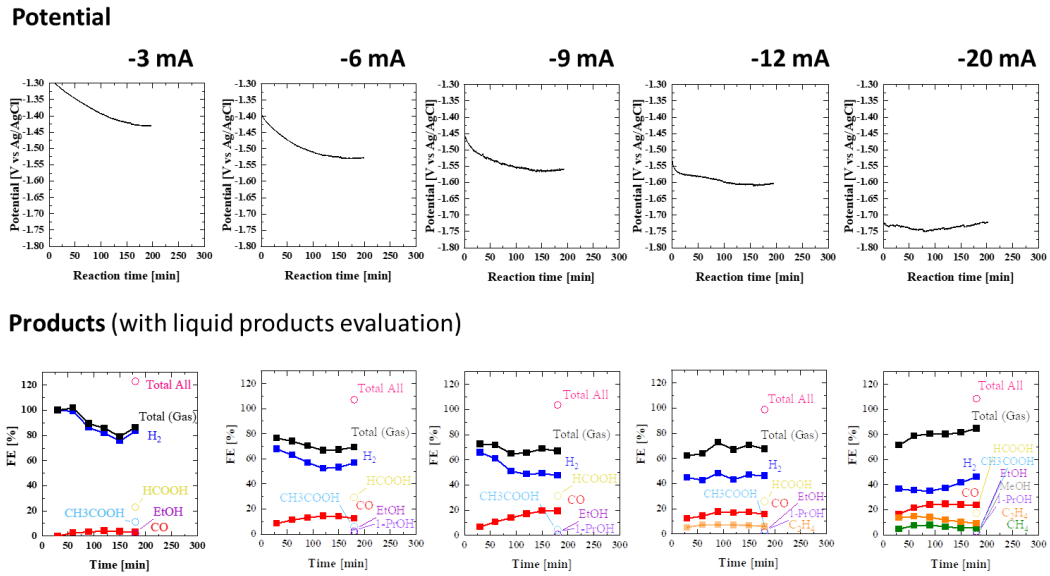

Fig. S1-3 Time-dependent potentials (vs. Ag/AgCl (3 mol/dm^3 NaCl aqueous solution)) and faradaic efficiencies (FEs) of the gas products for the Cu electrode at applied currents (from left to right) of –3, –6, –9, –12, and –20 mA. The liquid products in the electrolytes were evaluated after reaction.

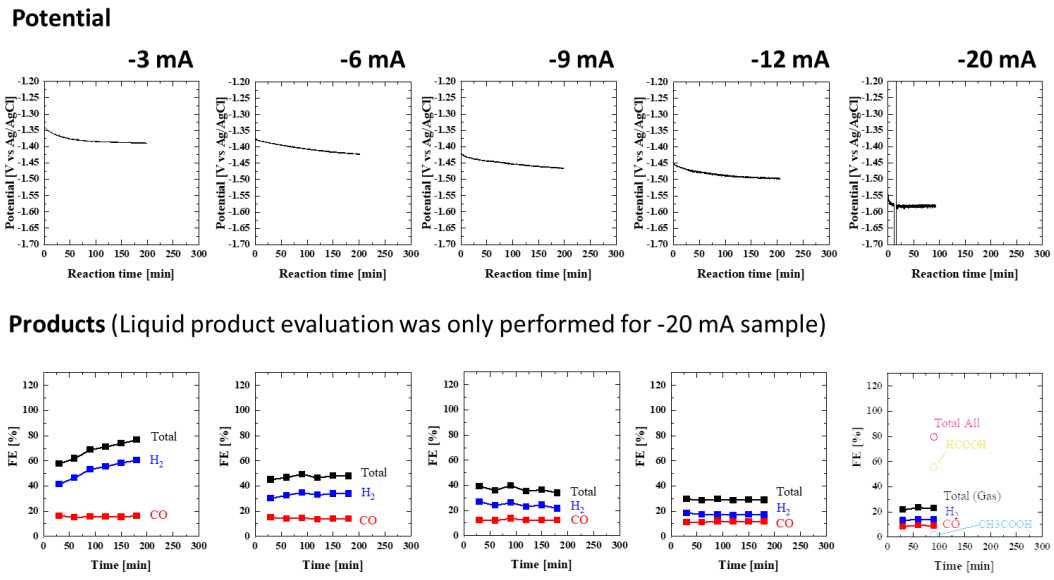

Fig. S1-4 Time-dependent potentials (vs. Ag/AgCl (3 mol/dm^3 NaCl aqueous solution)) and faradaic efficiencies (FEs) of the gas products for the Sn electrode at applied currents of (from left to right) –3, –6, –9, –12, and –20 mA. The liquid products produced in the electrolytes at –20 mA were evaluated after the reaction. “Total All” indicates the sum of gas and liquid products.

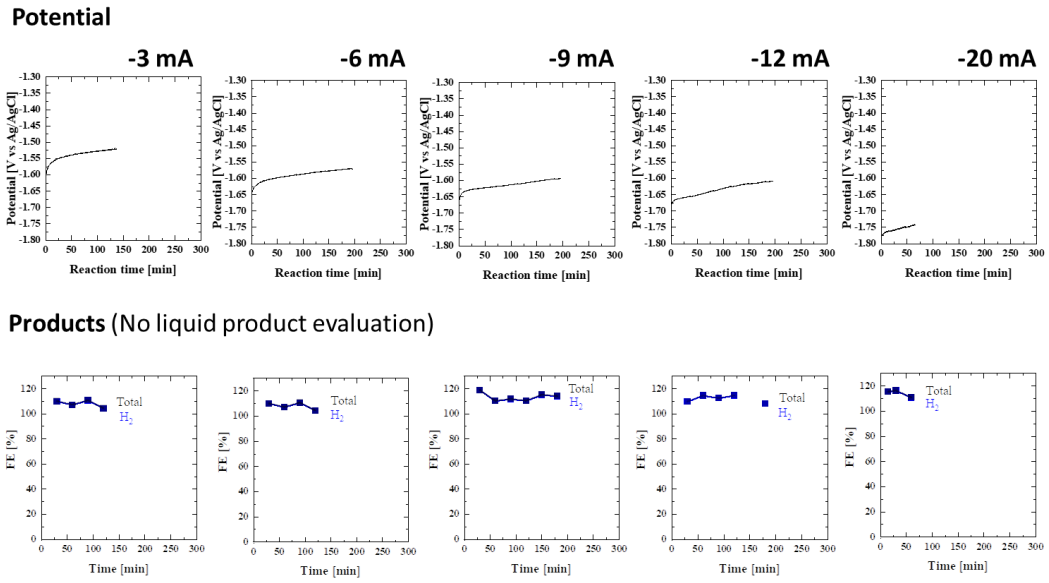

Fig. S1-5 Time-dependent potentials (vs. Ag/AgCl (3 mol/dm^3 NaCl aqueous solution)) and faradaic efficiencies (FEs) of gas products for the Ti electrode at applied currents of (from left to right) –3, –6, –9, –12, and –20 mA.

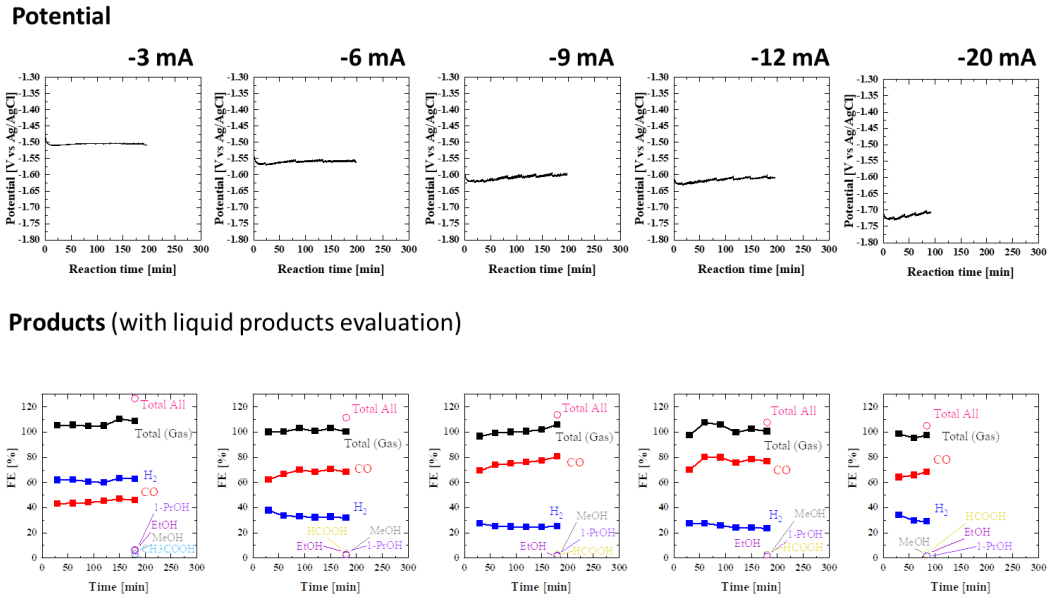

Fig. S1-6 Time-dependent potentials (vs. Ag/AgCl (3 mol/dm^3 NaCl aqueous solution)) and faradaic efficiencies (FEs) of gas products for the Zn electrode at applied currents of (from left to right) –3, –6, –9, –12, and –20 mA. The liquid products produced in the electrolytes were evaluated after reaction. “Total All” indicates the sum of gas and liquid products.

S2. Cyclic voltammograms of pure metals

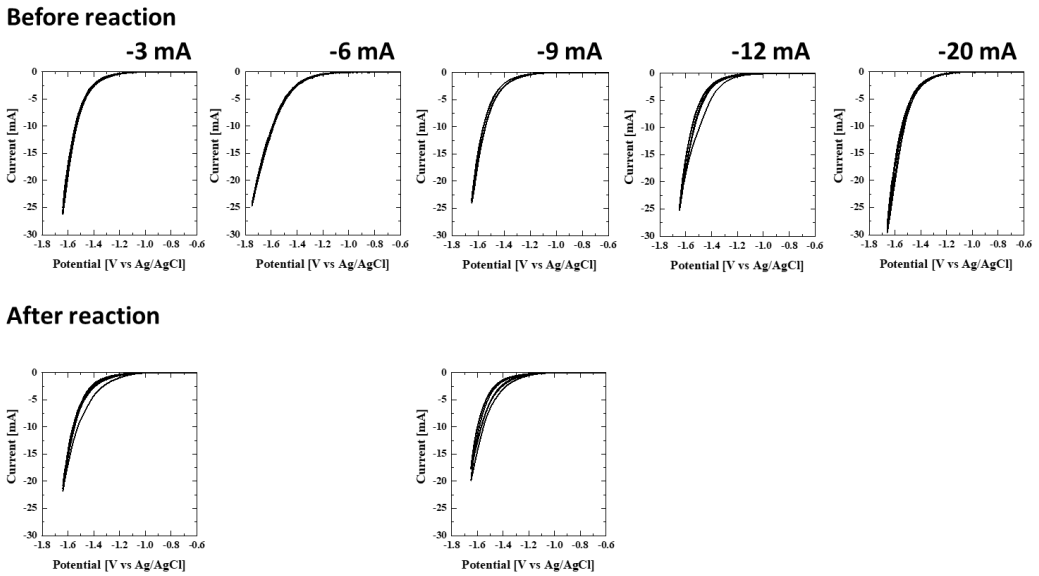

Fig. S2-1 Cyclic voltammograms (four cycles) of the Ag electrode before and after the CO_2 reduction reaction.

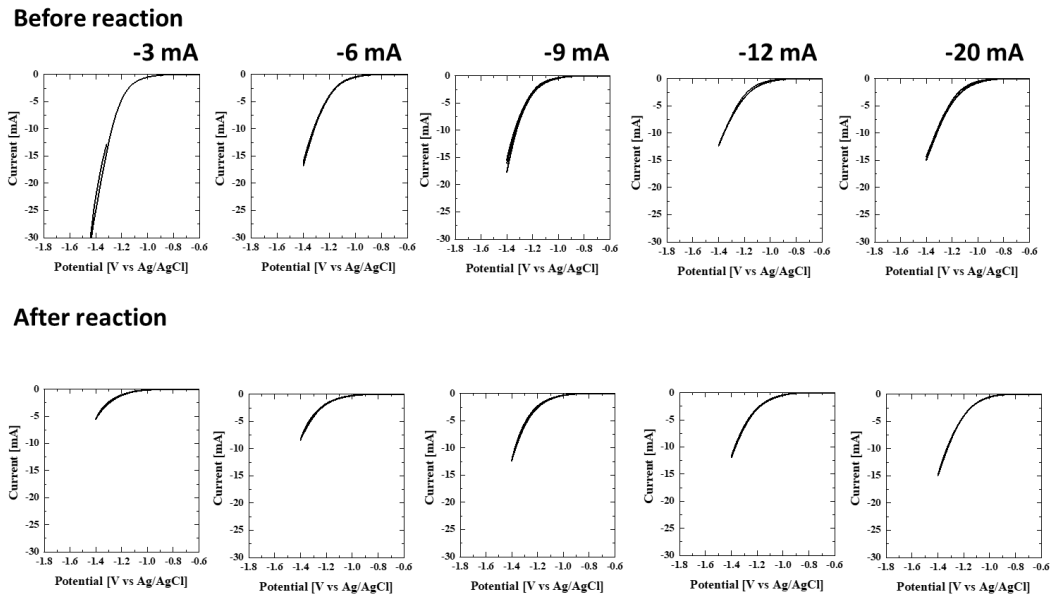

Fig. S2-2 Cyclic voltammograms (four cycles) of the Au electrode before and after the CO_2 reduction reaction.

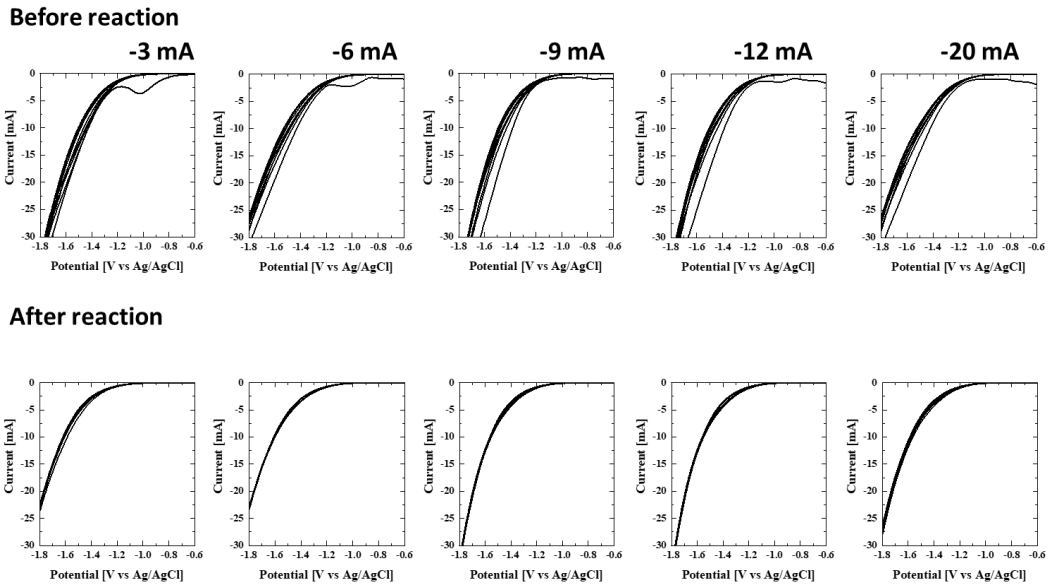

Fig. S2-3 Cyclic voltammograms four cycles) of the Cu electrode before and after the CO_2 reduction reaction.

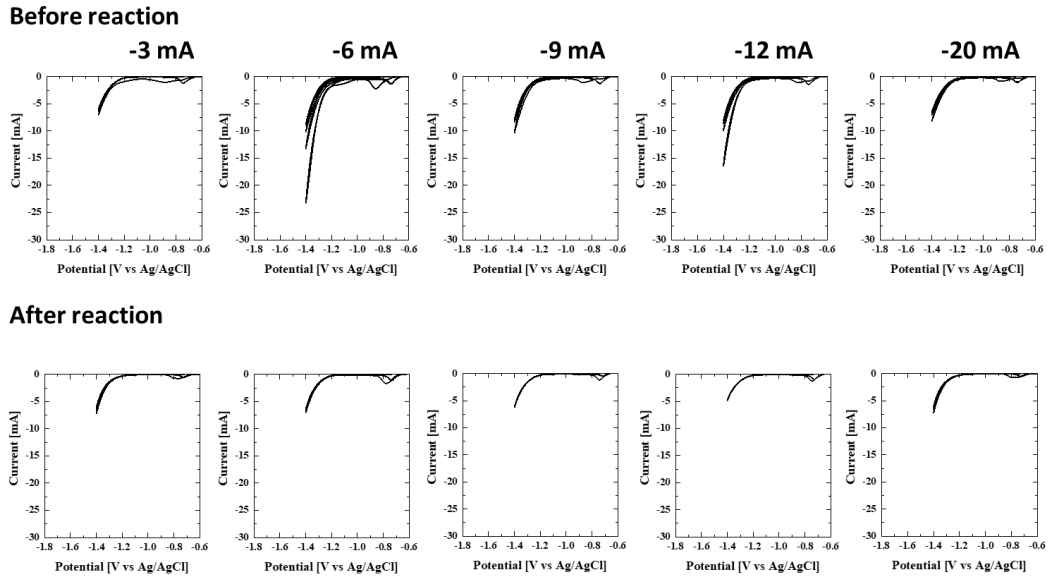

Fig. S2-4 Cyclic voltammograms (four cycles) of the Sn electrode before and after the CO_2 reduction reaction.

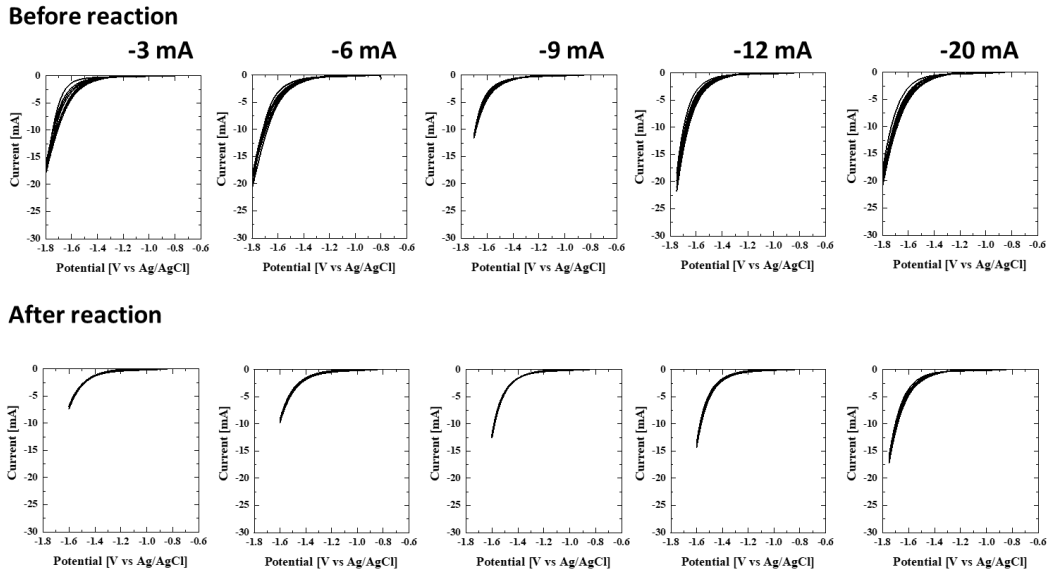

Fig. S2-5 Cyclic voltammograms (four cycles) of the Ti electrode before and after the CO_2 reduction reaction.

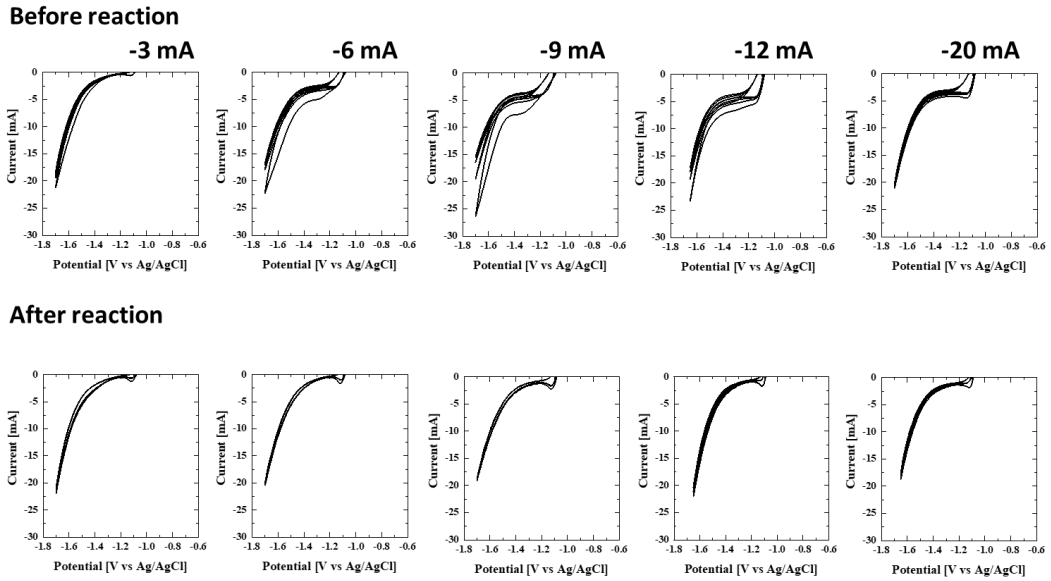

Fig. S2-6 Cyclic voltammograms (four cycles) of the Zn electrode before and after the CO_2 reduction reaction.

S3. Cyclic voltammograms of Ag-nanoparticle spray-coated metals

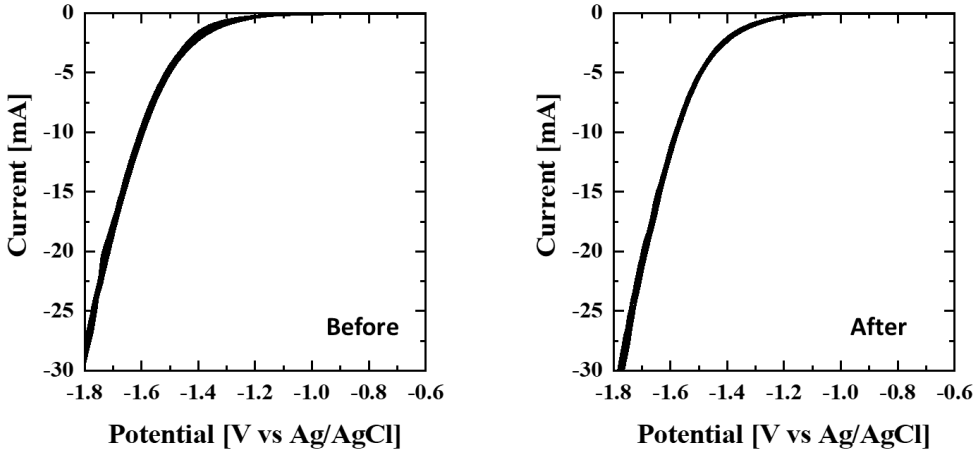

Fig. S3-1 Cyclic voltammograms four cycles) of the Ag-nanoparticle spray-coated Ag electrode before and after the CO_2 reduction reaction.

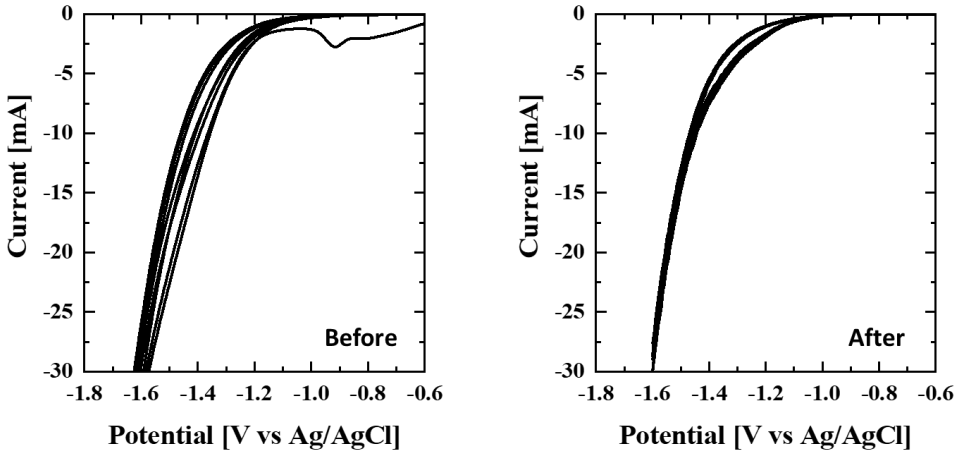

Fig. S3-2 Cyclic voltammograms four cycles) of the Ag-nanoparticle spray-coated Cu electrode before and after the CO_2 reduction reaction.

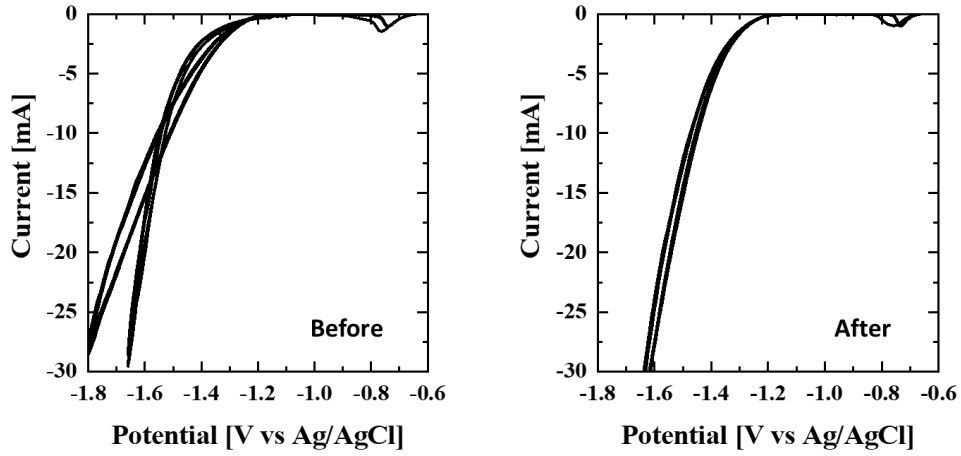

Fig. S3-3 Cyclic voltammograms four cycles) of the Ag-nanoparticle spray-coated Sn electrode before and after the CO_2 reduction reaction.

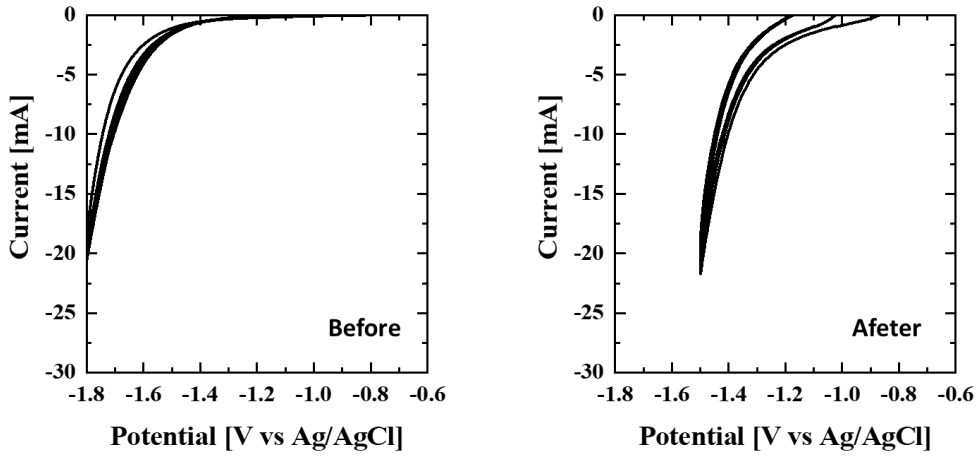

Fig. S3-4 Cyclic voltammograms (four cycles) of the Ag-nanoparticle spray-coated Ti electrode before and after the CO_2 reduction reaction.