

## Regulation of anti-oxidation behavior of silver-coated copper powders via cobalt modification

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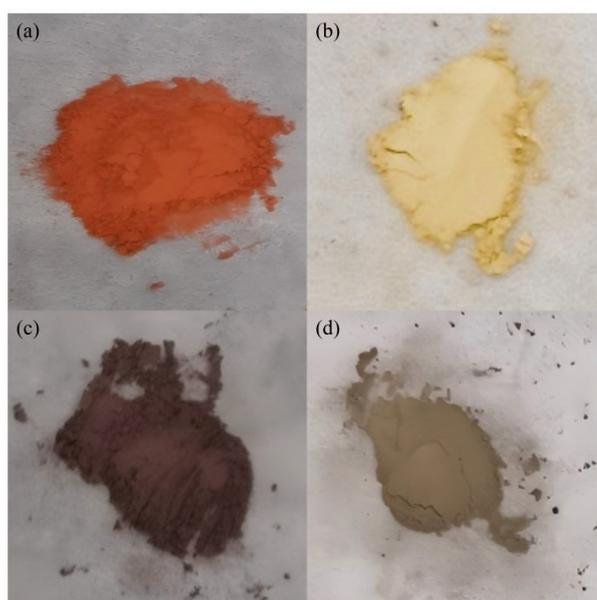
### 1. Experimental section

The corrosion behavior was performed using an electrochemical workstation (CHI660B, Gamry, America). The working electrode was prepared according to the following steps. Polyvinylidene difluoride and composite powders were combined in an even amount. Next, an appropriate amount of N-methyl-2-pyrrolidone was added. The sample was then evenly coated on the titanium plate and kept in the oven at 60 °C for 1~2 h (the titanium plate size was 1 cm × 2 cm × 0.1 cm, the coating area was ~1 cm<sup>2</sup>, and the sample thickness was ~0.1 mm). During the test, the samples did not significantly fall off due to the action of the binder polyvinylidene difluoride. Tafel curves were obtained using a three-electrode system: a calomel electrode as reference electrode, a platinum electrode as counter electrode, and a prepared electrode as working electrode. The Tafel polarization curves were performed at room temperature

with a scan range of -0.5V to 0.5V (vs. EOCp) and a scan rate of 10 mV/s. Using a three-necked flask, 250 mL of a 0.5000 mol/L Na<sub>2</sub>SO<sub>4</sub> neutral solution was employed for the corrosion experiment.

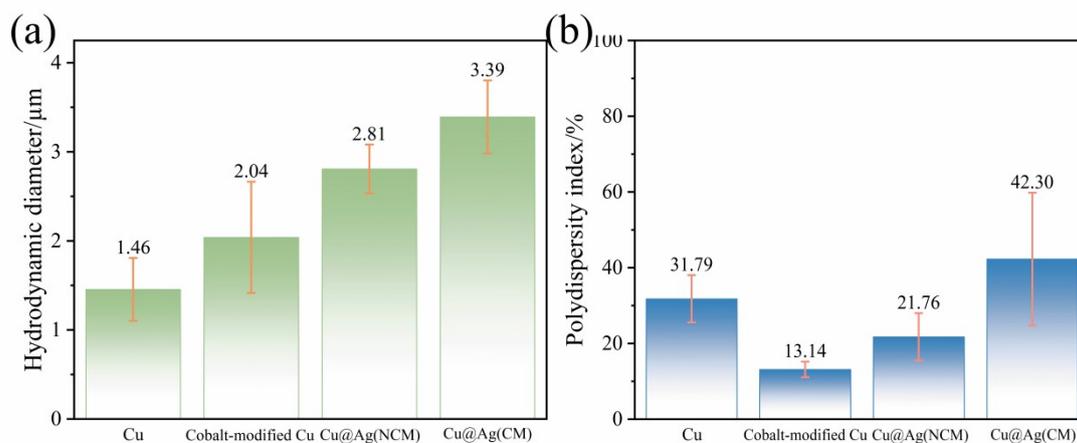
## 2. Supplementary Figures

### 2.1 Appearance



**Fig. S1** The appearance of (a) Cu, (b) Cu@Ag (NCM), (c) cobalt-modified Cu, and (d) Cu@Ag (CM) powders

### 2.2 The particle size of silver-coated copper powders

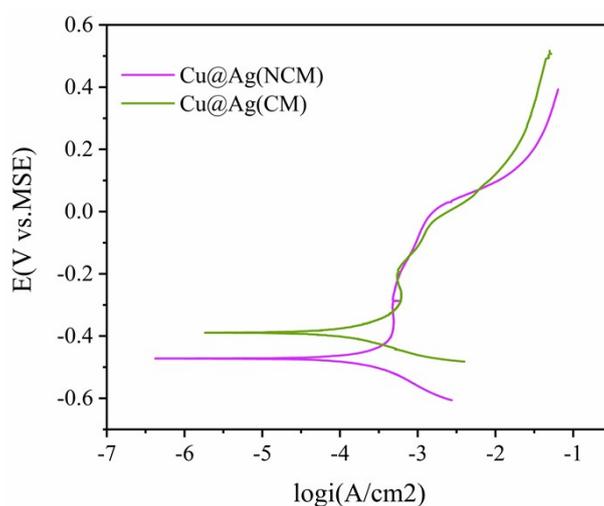


**Fig. S2** (a) Mean hydrodynamic diameter and (b) polydispersity index of pure Cu, cobalt-modified Cu, Cu@Ag (NCM), Cu@Ag (CM) powders.

The thickness of the Ag shell can be approximately calculated by the following formula.

$$Thickness(Ag\ shell) \approx \frac{D50_{Cu@Ag(NCM,CM)} - D50_{Cu}}{2}$$

### 2.3 The corrosion resistance of silver-coated copper powders



**Fig. S3** Tafel curves of Cu@Ag (NCM) and Cu@Ag (CM) sample in  $0.5\ mol \cdot L^{-1}\ Na_2SO_4$

A three-electrode system is used to obtain the Tafel polarization curves; Fig. S3 displays the relevant results. Cu@Ag (CM) powder has a higher corrosion potential and a lower corrosion current density than Cu@Ag (NCM) powder owing to the cobalt modification. The corrosion potential and corrosion current density of Cu@Ag (NCM) and Cu@Ag (CM) powders are -0.473 V,  $0.519 \times 10^{-5}\ mA/cm^2$ , and -0.389 V,  $0.145 \times 10^{-5}\ mA/cm^2$ , respectively. Therefore, Cu@Ag (CM) powder exhibits the best corrosion resistance. These findings suggest that as thicker Ag shells grow on the Cu cores (Fig.2), the corrosion resistance of the Cu@Ag powders is expected to improve.