Electronic Supplementary Information

Fabrication of Stable CdS Photoanode for Photoelectrochemical CO₂ Reduction under Visible-Light Irradiation

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Figure S1 XRD patterns of CdS electrode prepared by CBD method for (a) 0.5, (b) 1, (c) 2, and (d) 3 min.
**Figure S2** Photoabsorption spectra of CdS electrodes prepared by CBD for 0.5, 1, 2, and 3 min.

**Figure S3** Photoabsorption spectra of CdS electrodes before and after calcination in N\textsubscript{2} flow at 200, 300, 400, and 500 °C for 30 min.
Figure S4 Crystal structure of $K_2Cd[Fe(CN)_6]$.

Figure S5 XRD patterns of CdS electrodes prepared by CBD for 2 min with and (a) without the calcination in $N_2$ flow at (b) 200, (c) 300, (d) 400 and (e) 500 °C for 30 min after chronoamperometry measurement in borate buffer solution (pH 8) containing $K_4[Fe(CN)_6]$ (0.1 M) at −0.5 V vs. Ag/AgCl under visible-light irradiation.
Figure S6 XP spectra of Cd 3d, S2p and Fe 2p\textsubscript{3/2} region for CdS electrodes prepared by CBD for 2 min with and without the calcination in N\textsubscript{2} flow at 200, 300, 400 and 500 °C for 30 min after chronoamperometry measurement in borate buffer solution (pH 8) containing K\textsubscript{4}[Fe(CN)\textsubscript{6}] (0.1 M) at –0.5 V vs. Ag/AgCl under visible-light irradiation.

Figure S7 XP spectra of Cd 3d region for CdS electrodes prepared by CBD for 2 min with and without the calcination in N\textsubscript{2} flow at 200, 300, 400 and 500 °C for 30 min before and after chronoamperometry measurement.
Figure S8 Photoabsorption spectra of CdS electrodes before and after the reaction, along with photographs of CdS electrodes.
Figure S9 Time course of gas evolution over the CoOₓ-loaded TaON electrode system under visible-light irradiation with an applied bias of 0.5 V vs. Ag counter electrode. Anode side: borate buffer solution containing 0.1 M K₄[Fe(CN)₆], CO₂ bubbling (pH 6.8). Cathode side: borate buffer solution, CO₂ bubbling (pH 6.8). The inset shows the changes in the photocurrent.