Supporting Information

Designing Effective Si/Ag Interface via Controlled Chemical Etching for Photoelectrochemical CO₂ Reduction

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Figure S1. (a) Side-view SEM image of e-Si/Ag etched for 35s; (b, c) corresponding Si and Ag EDX mapping of the all area in (a); (d) XRD pattern and (e) Ag 3d XPS of e-Si/Ag.



Figure S2. (a) SEM image of Si/Cu; (b) polarization curves of Si/Cu under 0.5 sun illumination in CO₂-saturated 0.5 M KHCO₃; (c) corresponding potential-dependent CO Faradaic efficiency of e-Si/Cu.



Figure S3. (a) Polarization curves of e-Si/Ag and pristine Si under 0.5 sun illumination in CO₂saturated 0.5 M KHCO₃; (b) corresponding potential-dependent H_2 Faradaic efficiency of pristine Si.



Figure S4. (a) Potential-dependent H_2 or CO Faradaic efficiency of Si/Ti/Ag, and (b) the change of

H₂ or CO Faradaic efficiency at -0.8 V over time.



Figure S5. (a) Surface changes of Si/Ti(10nm)/Ag(30nm) before and after 10 CV cycles; (b) polarization curves of Si/Ti(10nm)/Ag(30nm), Si/Ti(5nm)/Ag(5nm) and e-Si/Ag under 0.5 sun illumination in CO₂-saturated 0.5 M KHCO₃.



Figure S6. Potential-dependent CO Faradaic efficiency of e-Si/Ag etched for (a) 10 s and (b) 60 s.



Figure S7. Potential-dependent CO Faradaic efficiency of e-Si /Ag under different light intensities: (a) 0.2 sun and (b) 1 sun.



Figure S8. SEM images of e-Si/Ag after the long-term stability test.