Supporting Information

Electrochemical Reduction of Carbon Dioxide on Au Nanoparticles: an in-Situ FTIR Study

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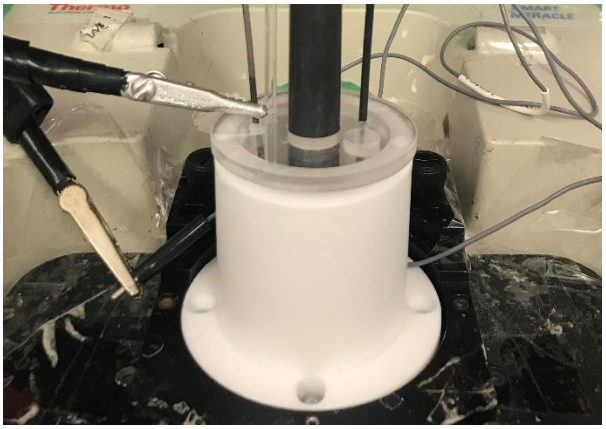

Figure S1. A photograph of the in-Situ electrochemical FTIR cell setup.

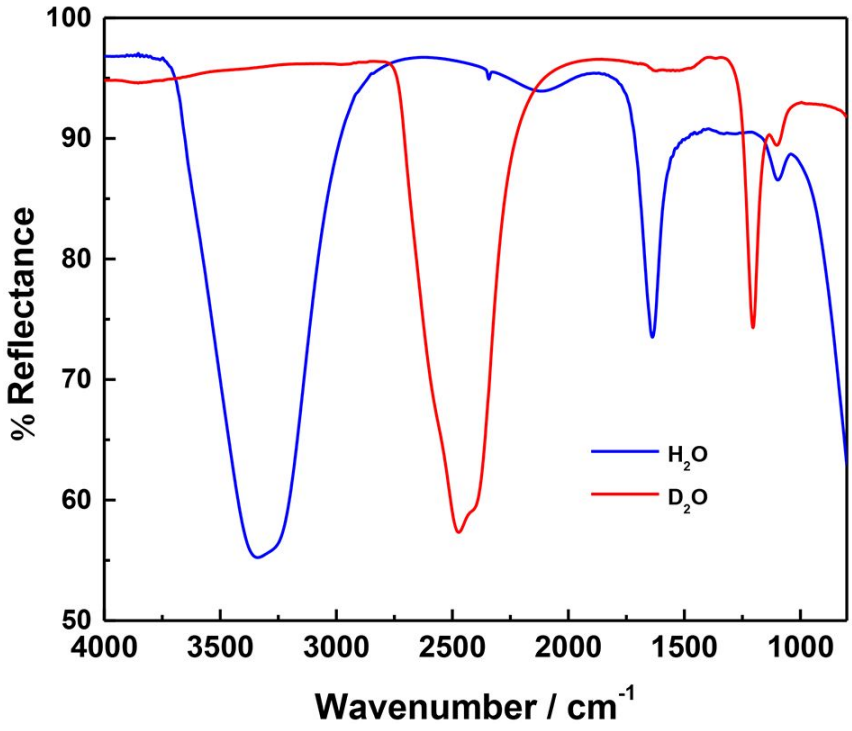

Figure S2. The reference spectra collected at the potential of 0.2 V vs RHE in a 0.1M Na_2SO_4 saturated with CO_2, where either H_2O or D_2O was used as the solvent.

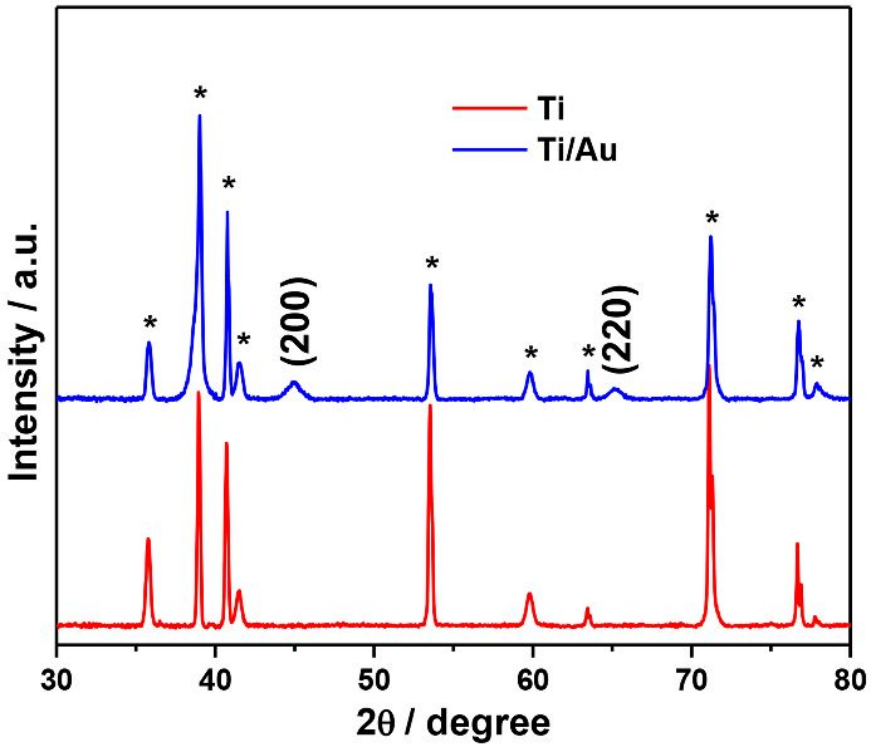

Figure S3. XRD patterns of Ti/Au (blue) and Ti plate (red).

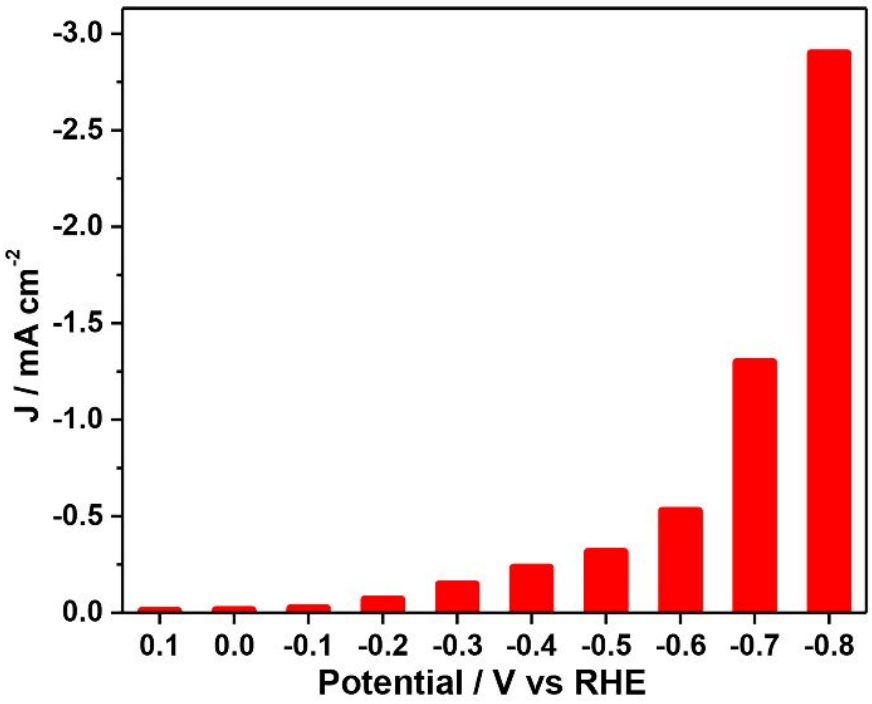

Figure S4. Steady current densities at 50 s from Fig. 3(c) at various applied potentials.

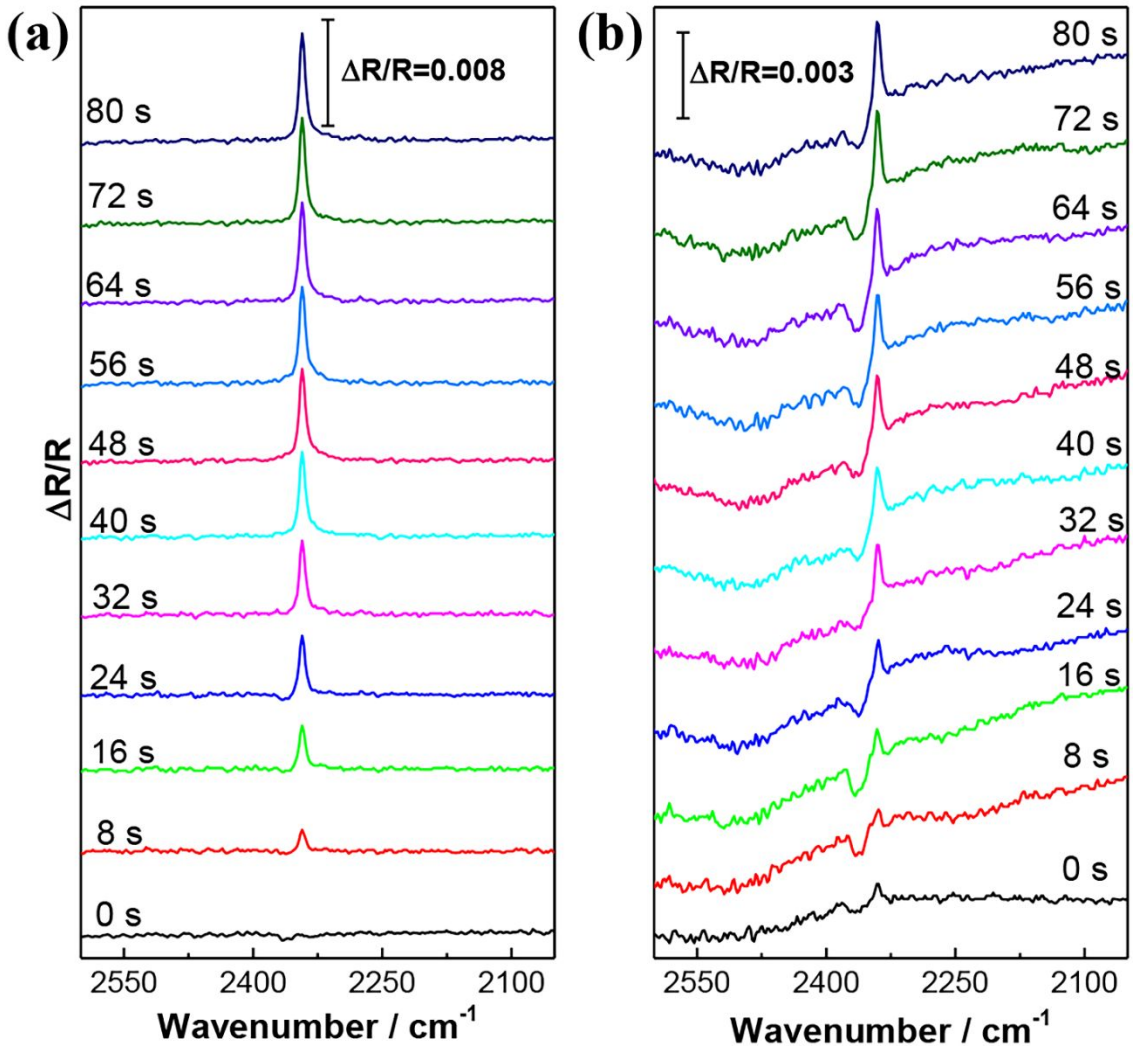

Figure S5. CO_2 consumption peaks in H_2O (a) and in D_2O (b) at 2344 cm^{-1} from SNIFTIR spectra on the Au electrode following saturation with CO_2 in a 0.10 M Na_2SO_4 solution every eight seconds, from 0 second to 80 seconds under an applied potential of -0.50 V. $\mathbf{\Delta}R/R = (R_{E2}-R_{E1})/R_{E1}$, where the reference spectrum R_{E1} was taken at E = 0.20 V.

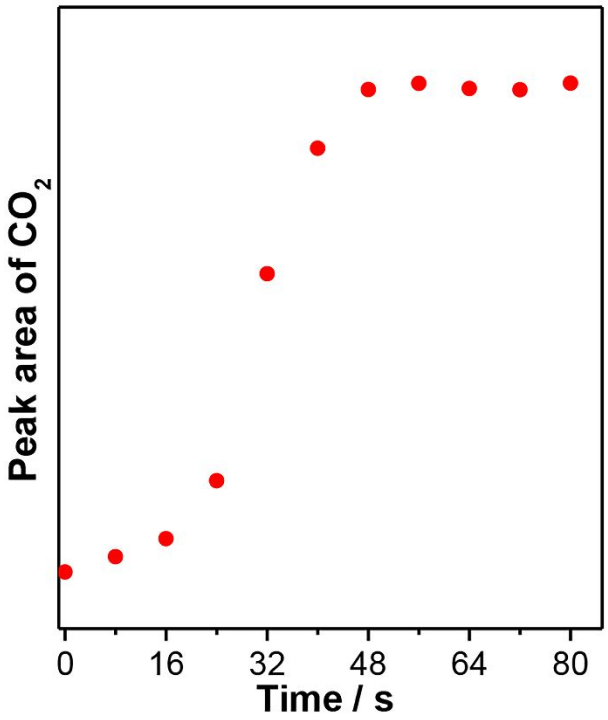

Figure S6. CO_2 consumption peak areas at 2344 cm^{-1} from SNIFTIR spectra every eight seconds, from 0 second to 80 seconds on the Au following saturation with CO_2 in a 0.10 M Na_2SO_4 solution in H_2O, under an applied potential -0.50 V.

Table S1. Peak positions (cm^{-1}) present in 0.10 M Na_2SO_4 with H_2O and D_2O and their assignments.

Wavenumber (cm^{-1})	**Peak assignment**	**Wavenumber (cm^{-1})**	**Peak assignment**	
3300	ν_{ss} (HOH)	2520	ν_{ss} (DOD)	H_2O D_2O
1645	ν_{sb} (HOH)	1190	ν_{sb} (DOD)	
2344	ν_{as} (OCO) (CO_2)	2341	ν_{as} (OCO) (CO_2)	CO_2
1560	ν_{as} (COO^-)	1560	ν_{as} (COO-)	COO^- (Adsorbed)
1410	ν_{ss} (COO^-)	1410	ν_{ss} (COO^-)	
1460	ν_{ss} (OCO)	1460	ν_{ss} (OCO)	HCO_3^- DCO_3^-
1360	ν_{ss} (OCO)	1366	ν_{ss} (OCO)	
1100	ν_{ss} SO_4	1095	ν_{ss} (SO_4)	SO_4^{2-}
1640	ν_{as} (COO^-)	1627	ν_{as} (COO^-)	$HCOO^-$ $DCOO^-$
1298	ν_{ss} (COO^-)	1283	ν_{ss} (COO^-)	
1350	ν_b (CH)	986	ν_b (CD)	