Supporting Information

Investigating the physical and electrochemical effects of cathodic polarization treatment on TaO_x

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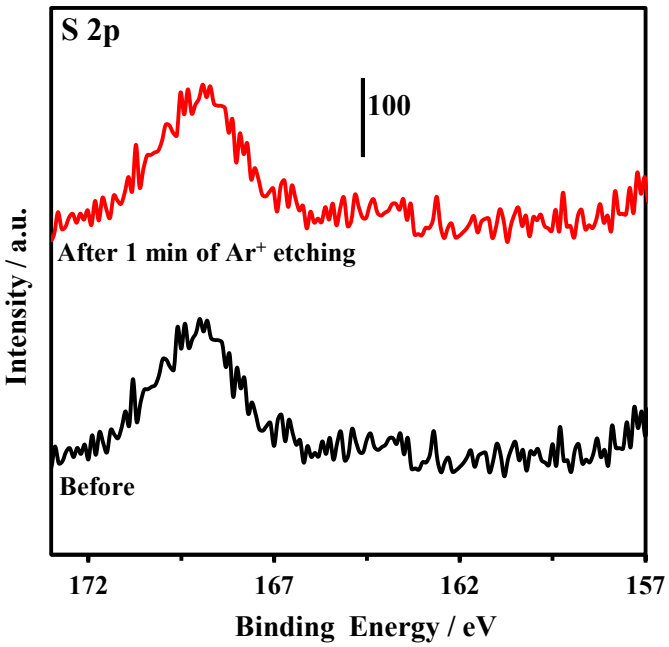

Fig. S1 S 2p XPS spectra obtained at the bare GC electrode treated by the electrochemical reduction treatment for 30 cycles before and after 1 min of Ar^+ bombardment. This result shows no adsorption of sulfate on the bare GC surface after the electrochemical treatment.

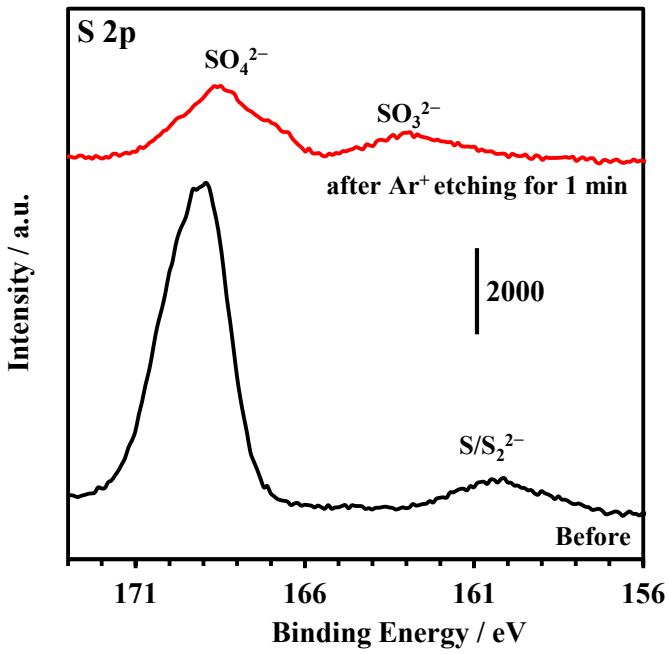

Fig. S2 S 2p XPS spectra obtained at the TaO_x/GC electrode treated by the CV treatment for 30 cycles before and after Ar^+ etching for 1 min.

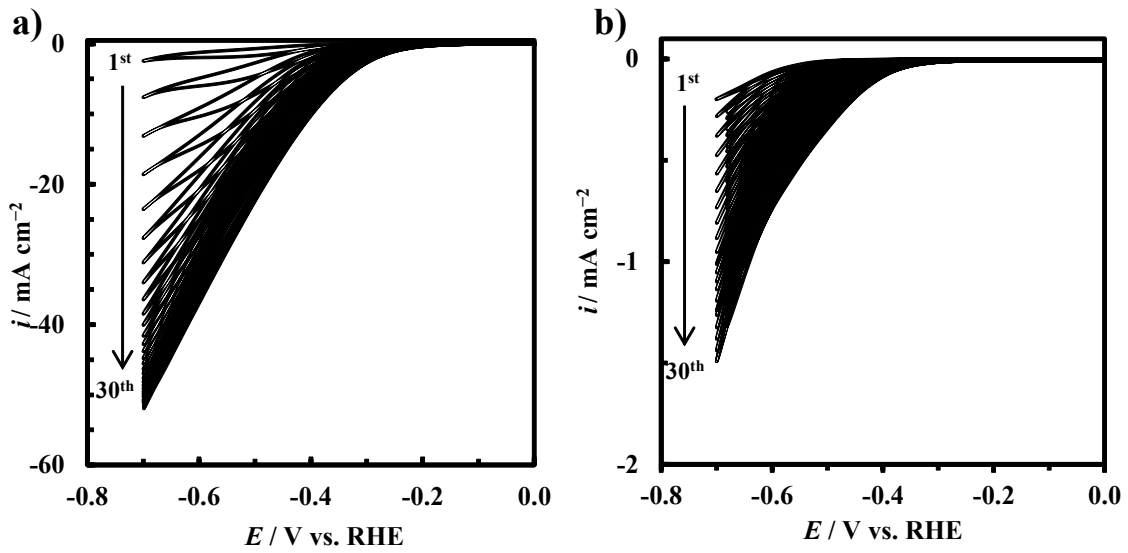

Fig. S3 CVs obtained at the TaO_x/GC (a) and bare GC (b) electrodes in N_2-saturated 2 M H_2SO_4 at scan rate 20 mV s^{-1}.

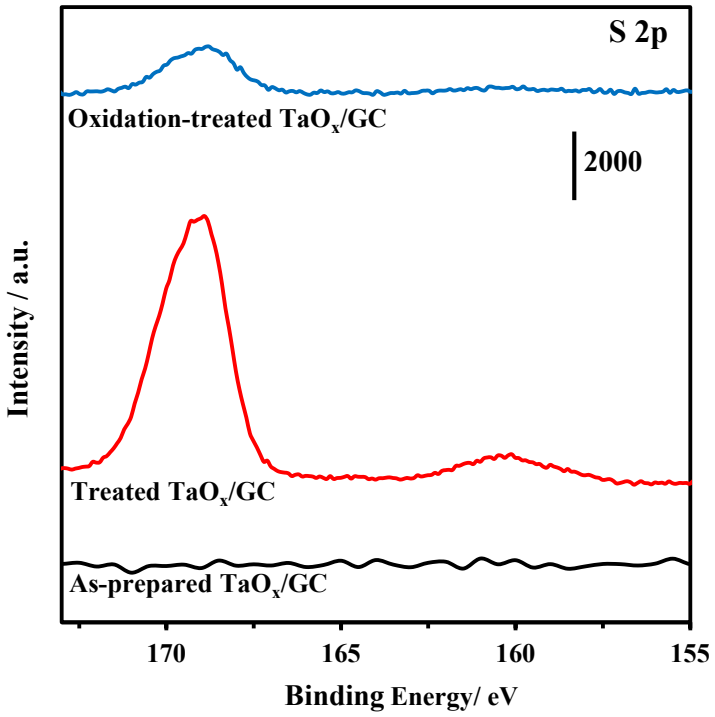

Fig. S4 S 2p XPS spectra obtained at the TaO_x/GC electrode before (bottom) and after the CV treatment for 30 cycles (mid), and then followed with oxidation by potential cycling between −0.2 V and 1.23 V in N_2-saturated 0.5 M H_2SO_4 at scan rate of 50 mV s^{-1} for 10 cycles (top).

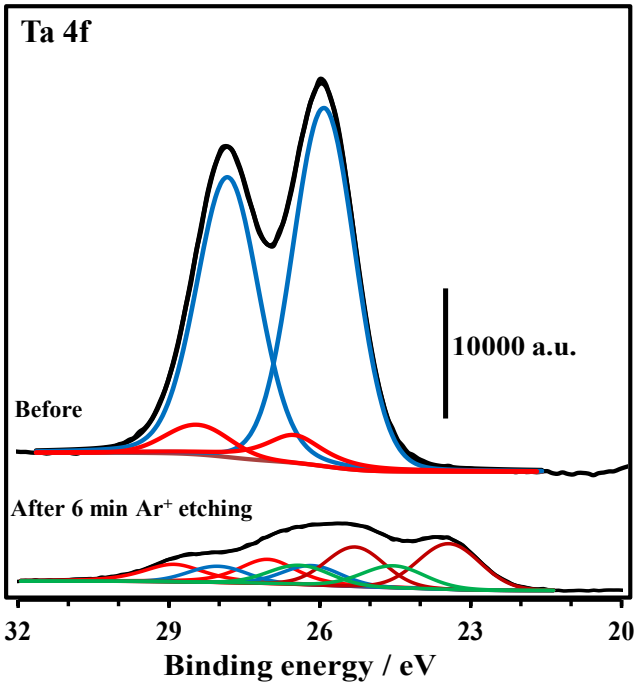

Fig. S5 Ta 4f XPS spectra obtained at the TaO_x/GC electrode treated by the CV treatment for 1000 cycles before and after Ar^+ etching for 6 min.