Electronic Supplementary Material (ESI) for Sustainable Energy & Fuels.

A desulfurization fuel cell with alkali and sulfuric acid byproducts: prototype and model

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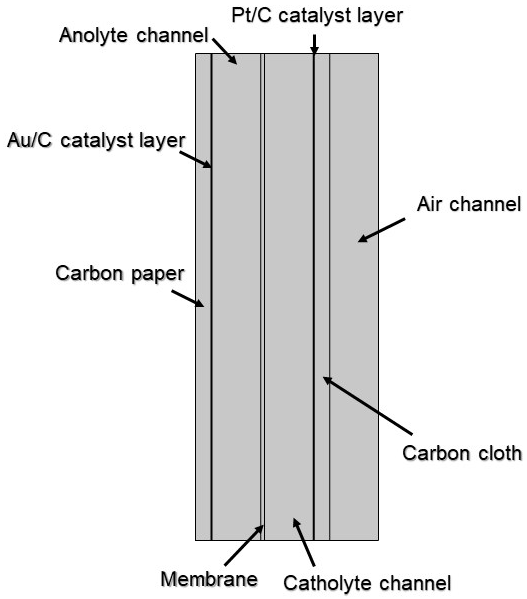

Figure S1 Schematic of 2-D numerical model

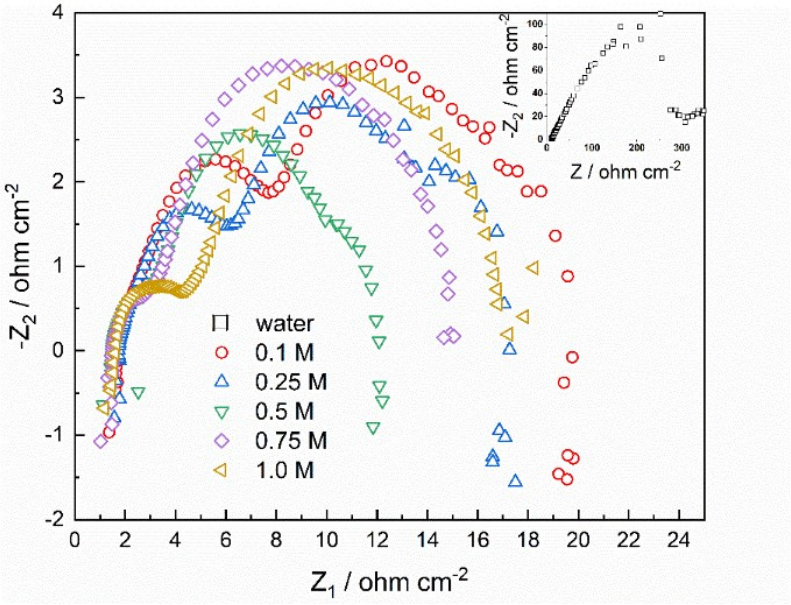

Figure S2 Nyquist plots of the sulfite/air fuel cell with different NaOH concentrations

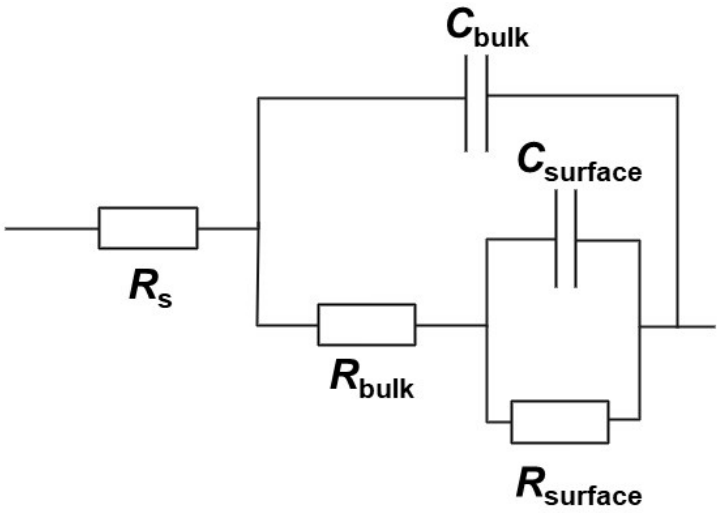

Figure S3 Equivalent circuit of EIS tests

Table S1 The EIS calculation results of the sulfite/air fuel cell with different NaOH concentrations based on the equivalent circuit

c(NaOH) / mol L^{-1}	R_s / Ω	R_{bulk} / Ω	C_{bulk} / F	$R_{surface}$ / Ω	$C_{surface}$ / F
0	2.80	269.30	1.14×10^{-5}	444.70	1.48×10^{-4}
0.1	2.23	6.51	7.28×10^{-5}	9.39	6.45×10^{-3}
0.25	2.15	5.08	8.18×10^{-5}	8.37	6.91×10^{-3}
0.5	1.81	2.73	3.01×10^{-4}	6.46	6.85×10^{-3}
0.75	2.15	6.32	1.82×10^{-5}	5.94	2.69×10^{-3}
1.0	2.30	6.69	3.63×10^{-5}	1.02	$6.67\times10^{-}$

Table S2 The EIS calculation results of the sulfite/air fuel cell with different Na_2SO_3 concentrations based on the equivalent circuit

$c(Na_2SO_3)$ / mol L^{-1}	R_s / Ω	R_{bulk} / Ω	C_{bulk} / F	$R_{surface}$ / Ω	$C_{surface}$ / F
0.1	5.76	136.70	2.31×10^{-3}	464.80	9.04×10^{-3}
0.5	2.94	15.10	1.64×10^{-3}	33.27	3.92×10^{-2}
1.0	2.47	10.25	1.34×10^{-3}	10.07	4.52×10^{-2}
1.5	2.08	6.28	7.41×10^{-4}	7.57	2.19×10^{-2}
2.0	2.06	6.13	7.99×10^{-4}	6.97	2.26×10^{-2}

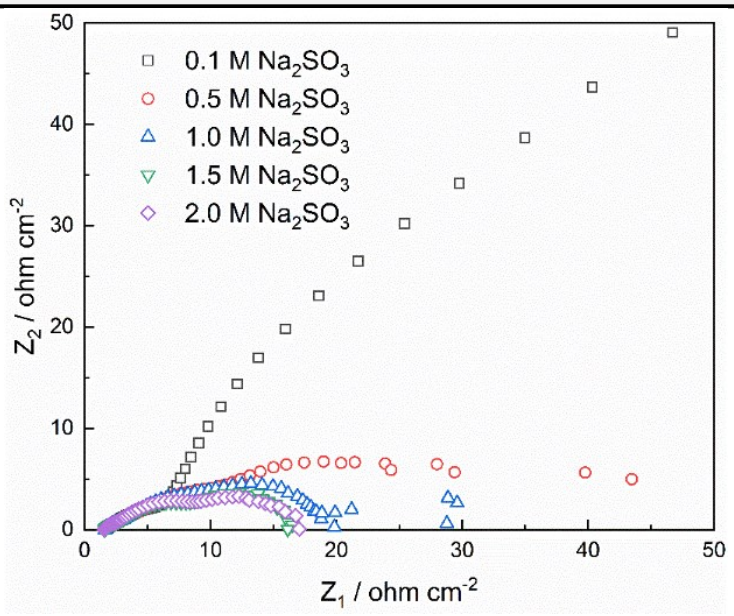

Figure S4 Nyquist plots of the sulfite/air fuel cell with different Na_2SO_3 concentrations

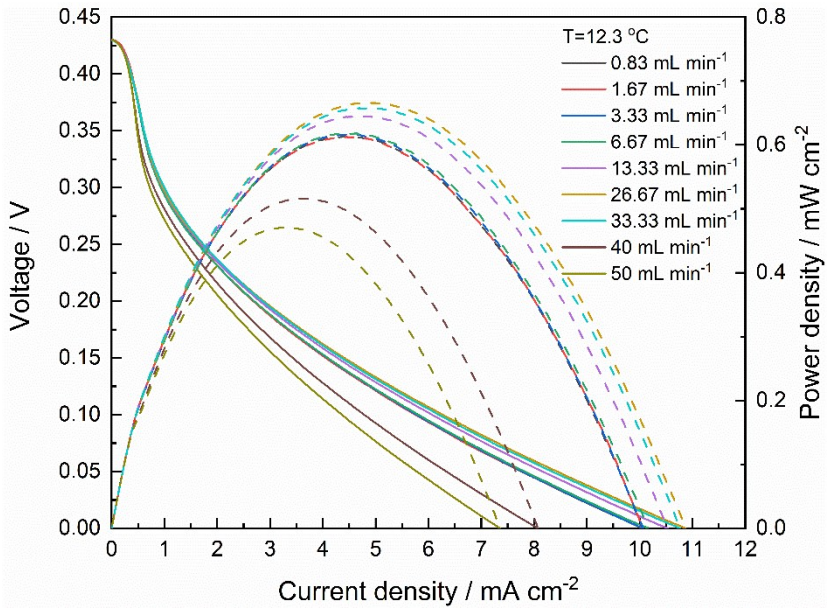

Figure S5 Effects of catholyte flow rate on the performances of the sulfite/air fuel cell