Table S1 | Parameter bounds and bounded decoding map for MXene EIS inference. Parameter-domain constraints (lower/upper bounds) and the corresponding decoding rules used consistently across the classical NLLS baseline, the continuous VQE/VQA branch, and the discrete QUBO/QAOA branch for the 7-parameter circuit $\theta = \{R_s, L, R_{ct}, Q_1, \alpha_1, Q_2, \alpha_2\}$. The table specifies each parameter's physical meaning and units and indicates whether the optimizer operates in a log-scaled or linear coordinate, with sigmoid-bounded mapping where applicable to guarantee feasibility (e.g., $R > 0$, $0 < \alpha \leq 1$) during optimization and decoding.

Parameter	Description	Units	Lower Bound	Upper Bound	Encoding Strategy
L	Inductance	H	1.88×10^{-8}	1.88×10^{-6}	Log-scale, sigmoid-bounded
R_s	Series resistance	Ω	0.0873	8.73	Log-scale, sigmoid-bounded
R_{ct}	Charge-transfer resistance	Ω	1.5	150	Log-scale, sigmoid-bounded
Q_1	CPE magnitude (branch 1)	$S \cdot s^{\alpha_1}$	2.62×10^{-4}	0.0262	Log-scale
α_1	CPE exponent (branch 1)	–	0.3	0.99	Linear, sigmoid
Q_2	CPE magnitude (branch 2)	$S \cdot s^{\alpha_2}$	2.12×10^{-4}	0.0212	Log-scale
α_2	CPE exponent (branch 2)	–	0.3	0.99	Linear