

Supporting Information

Exploring the Electrocatalytic Oxygen Evolution/Urea Oxidation Activity of Solution-
Combusted CuO/MnO₂: Machine Learning Insights from OER Performance

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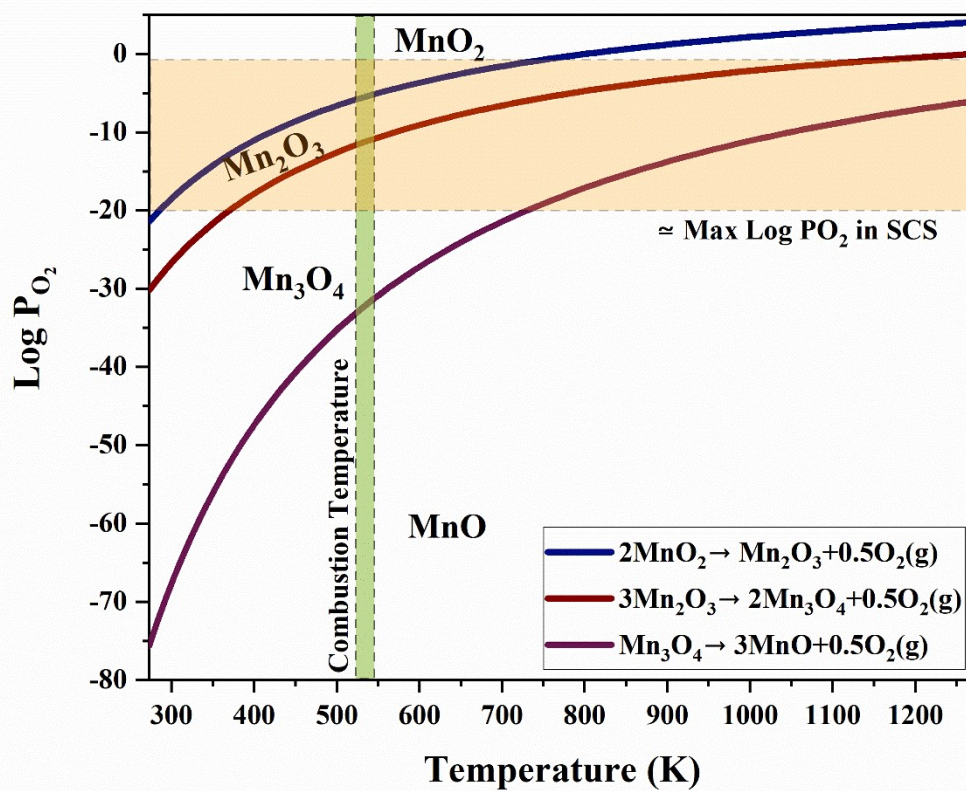


Fig. S1. Thermodynamic stability diagram of Mn-oxides system.

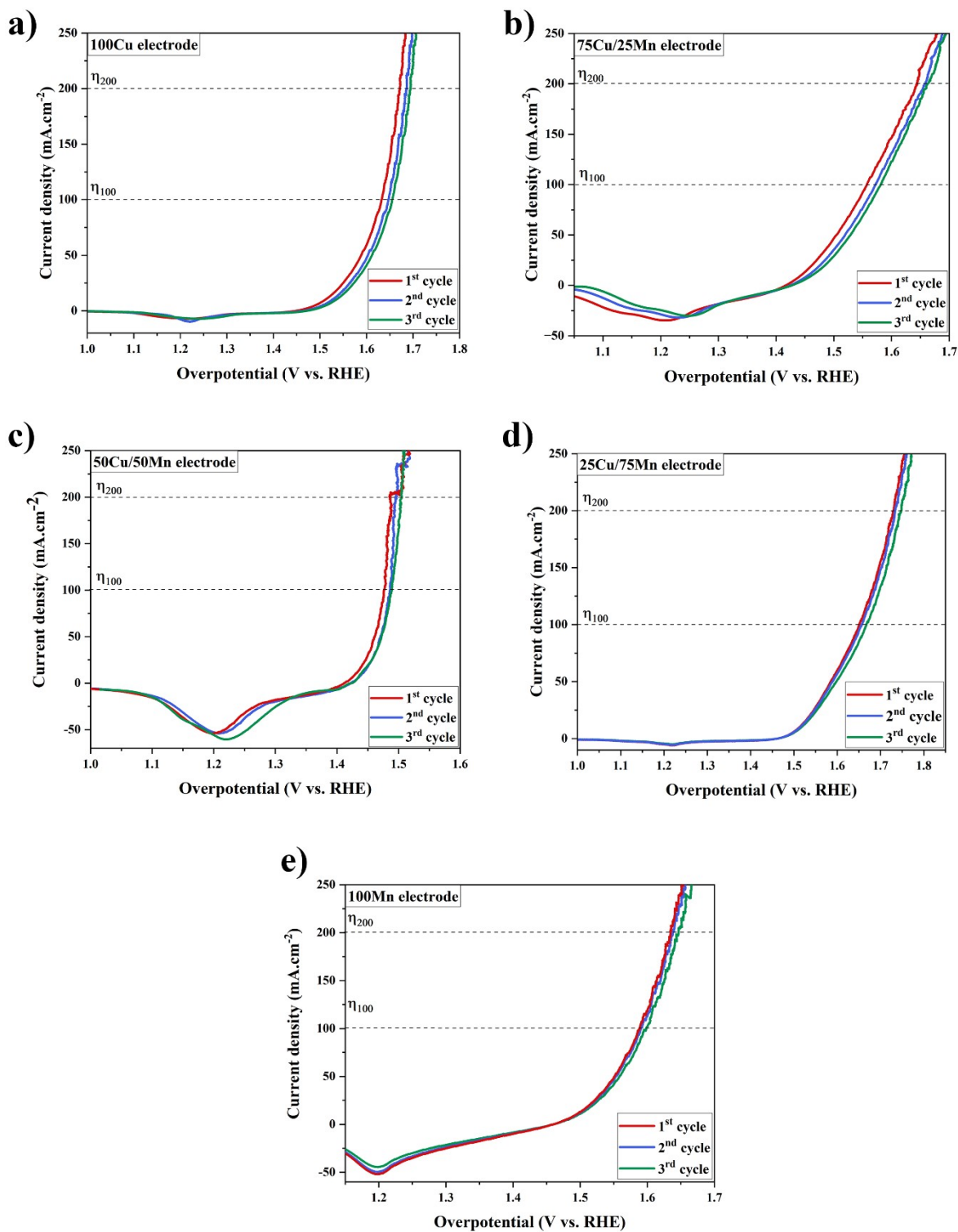


Fig. S2. LSV curves of all fabricated samples recorded over three consecutive cycles in 1 M KOH at a scan rate of $5 \text{ mV}\cdot\text{s}^{-1}$, demonstrating the cycling stability and reproducibility of the electrocatalytic response.

Table S1. Summary of statistical and structural similarity metrics between real and synthetic datasets.

Metric	Desirable / Optimaal range	Observed value
Per-feature KS tests	$p > 0.05$	$0.14 < p < 0.91$
Correlation structure	mean $ \Delta\text{Corr} \approx 0$	mean $ \Delta\text{Corr} = 0.299$
Mahalanobis distances	$\mu(\text{real}) \approx \mu(\text{synthetic})$, small σ	Real: $\mu = 2.37, \sigma = 0.12$ Synthetic: $\mu = 2.55, \sigma = 0.47$
Classifier two-sample test (C2ST)	$\text{AUC} \approx 0.5$	$\text{AUC} = 0.557 \pm 0.230$

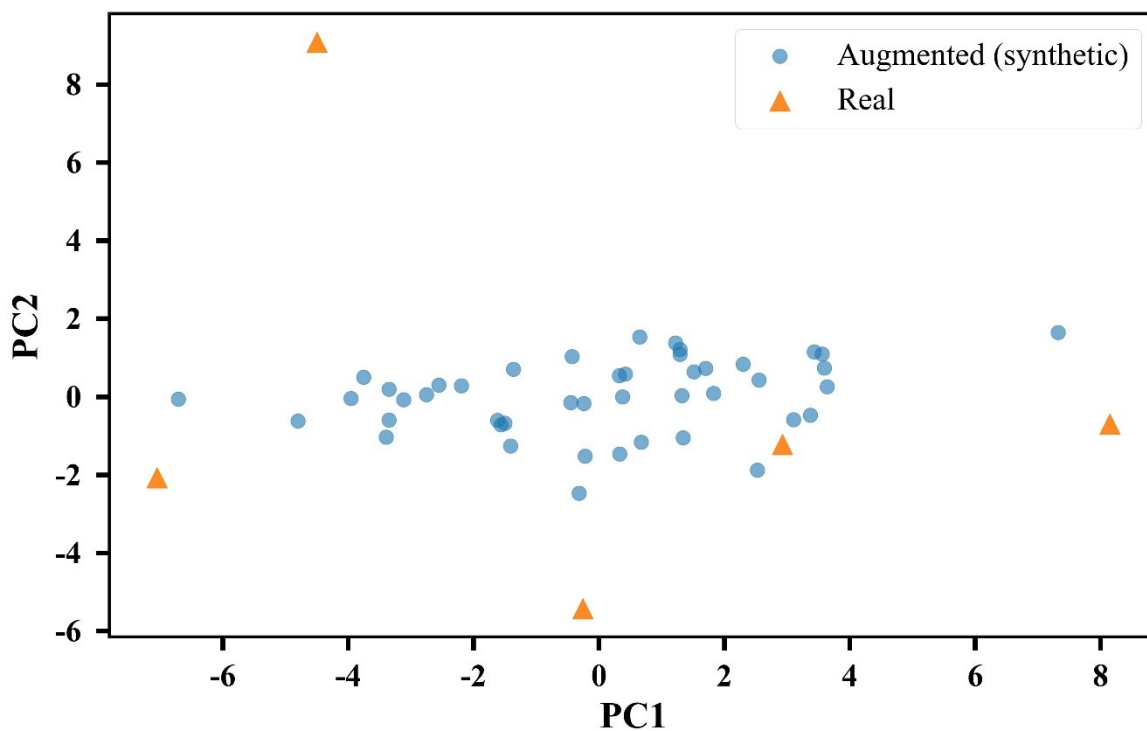


Figure S3. Visualization of real and synthetic samples in the first two principal component (PC) dimensions, showing that the synthetic data approximate the distribution of the real dataset.

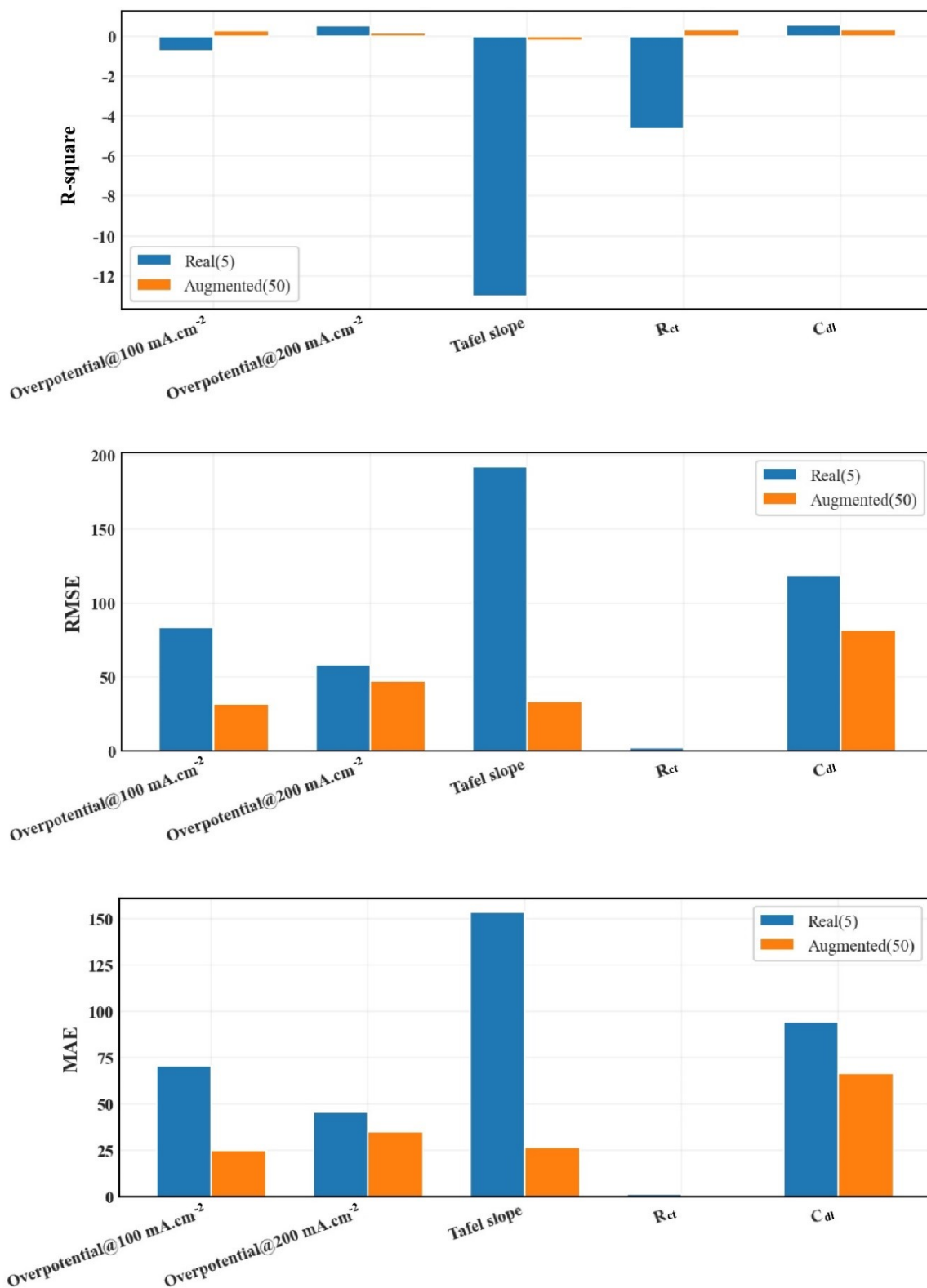


Fig. S4. Performance comparison between models trained on real (5 samples) and augmented (50 samples) data using R², RMSE, and MAE metrics.