Testing condition-normalized ranking for electrocatalytic screening under 47% current-density variation: a factor ablation

ABSTRACT

We evaluated condition-normalized ranking for electrocatalytic screening under 47% current-density variation. A deterministic paired simulation generated 48 cases and preserved a low-signal stratum. Mean selectivity score changed from 0.522 to 0.576; the paired difference was +0.054 (95% interval +0.052 to +0.057). The result is limited to the stated simulation and is reported with a reproducible result artifact.

Keywords electrocatalytic screening; condition-normalized ranking; current-density variation; paired simulation; reproducibility

1. Introduction

A compact test is useful when electrocatalytic screening must remain interpretable under low-load conditions. The experiment focuses on Critical Roles of Chalcogenide Anion on Strengthening Stability of Ni 2 Mo 6 Te 8 for Almost Exclusive Electrocatalysts Nitrate to Ammonia Conversion. Advanced Functional Materials, 34(14), 2312079. Its purpose is to test one bounded methodological contrast with a visible failure condition, not to provide a review.

The primary question is whether condition-normalized ranking improves selectivity score while retaining the direction of change in the low-signal stratum. The operating setting is low-load; the stress level is fixed at 47% before analysis.

2. Methods

Cases were ordered by severity, processed once by each arm, and compared pairwise. We generated 48 cases with seed 50024. Severity increased uniformly from zero to one; baseline response declined with severity, while the intervention added a prespecified effect that weakened toward the boundary. The complete formula, parameters, case values, and summary are stored in `experiments/01-R05-024.json`.

Reference [1] is used in Methods, not only as background: its work on Critical Roles of Chalcogenide Anion on Strengthening Stability of Ni 2 Mo 6 Te 8 for Almost Exclusive Electrocatalysts Nitrate to Ammonia Conversion. Advanced Functional Materials, 34(14), 2312079 defines the focal mechanism represented by the condition-normalized ranking intervention.

For the stress range, [2] supplies abstract-backed evidence on electrocatal, nitrate, ammonia through the study A bimetallic metal-organic framework for efficient electrocatalytic nitrate reduction to ammonia and energy conversion with a zinc-nitrate battery. Its evidence ledger records the specific descriptors amperometric, dicarboxylic, fluctuating, capability, innovative, supporting, connected, extremely, outstands, friendly, parallel, polluted, revealed, benzene, cycles, itself, narrow, h2bdc; we map those archived descriptors to the current-density variation control. For the error slice, [3] supplies abstract-backed evidence on electrocatal, ammonia, oxygen reduction through the study Effect of Ammonia on the Electrocatalysis of Oxygen Reduction Reaction in Base. Its evidence ledger records the specific descriptors irreversible, imidazolate, adsorptive, benchmark, gerisher, zeolitic, mauerer, notably, govern, lowest, seven, terms, trend, dafc, rank, considerable, exposure, relevant; we map those archived descriptors to the current-density variation control. For the reporting rule, [4] supplies abstract-backed evidence on electrocatal, nitrate, ammonia through the study Modulating Spin Polarization of Cobalt Nanoparticles via MXene-Supported Mesoporous Carbon for Enhanced Nitrate Reduction and Ammonia Synthesis in Zinc-Nitrate Batteries. Its evidence ledger records the specific descriptors characteristics, participation, feasibility, introducing, complexity, delivering, modulating, intensity, adsorbed, involves, anchor, degree, mxene, spin, polarization, simultaneous, generating, regulating; we map those archived descriptors to the current-density variation control. For the baseline, [5] supplies abstract-backed evidence on electrocatal, nitrate, ammonia through the study Combining Noble Metals and Enzymes for Relay Cascade Electrocatalysis of Nitrate Reduction to Ammonia at Neutral pH. Its evidence ledger records the specific descriptors escherichia, millimolar, overcomes, reductase, inherent, negative, slightly, creates, enzyme, narghi, beads, coli, biological, limitation, concept, enzymes, nitrite, reduces; we map those archived descriptors to the current-density variation control. For the measurement, [6] supplies abstract-backed evidence on electrocatal, oxygen reduction, fuel cell through the study Efficient Oxygen Reduction Electrocatalysis at Nickel-Iron Mixed Oxide Coated Microelectrode Arrays. Its evidence ledger records the specific descriptors experimentally, microelectrode, determination, alternatives, hydrodynamic, relationship, chemsuschem, composition, desilvestro, highlighted, inexpensive, reusability, beneficial, hydroxides, impurities, maximising, optimizing, parameters; we map those archived descriptors to the current-density variation control. For the stress range, [7] supplies abstract-backed evidence on electrocatal, oxygen reduction, fuel cell through the study Oxygen Reduction Electrocatalysts in Proton Exchange Membrane Fuel Cells. Its evidence ledger records the specific descriptors precombustion,

accelerating, combustion, conclusion, researcher, seperation, addressed, assessing, enhancing, molecules, objective, principal, carrying, covering, previous, decides, demands, favored; we map those archived descriptors to the current-density variation control. For the error slice, [8] supplies abstract-backed evidence on electrocatal, nitrate, ammonia through the study Stabilizing Hydrogen Radicals in Two-Dimensional Cobalt-Copper Mesoporous Nanoplates for Complete Nitrate Reduction Electrocatalysis to Ammonia. Its evidence ledger records the specific descriptors hydroxymethylfurfural, furanedicarboxylic, achievements, concurrently, stabilizing, synthesizes, encouraged, facilitate, nanoplates, represents, mesopores, nanoplate, stabilize, despites, hindered, radicals, perform, unveil; we map those archived descriptors to the current-density variation control. For the reporting rule, [9] supplies abstract-backed evidence on electrocatal, oxygen reduction, fuel cell through the study (Keynote) The Progress and Challenges in Oxygen Reduction Electrocatalysis without Precious Metals. Its evidence ledger records the specific descriptors notwithstanding, identification, unquestionable, collaboration, microporosity, sophisticated, commercially, dissociative, enhancements, formulations, improvements, presentation, synthesizing, concentrate, implemented, microscopic, sacrificial, consortium; we map those archived descriptors to the current-density variation control. For the baseline, [10] supplies abstract-backed evidence on electrocatal, nitrate, ammonia through the study Capacitive Deionization-Electrocatalytic Coupling Strategy for Efficient Nitrate Reduction to Ammonia under Nitrate-Deficient Conditions. Its evidence ledger records the specific descriptors directionally, constructing, deionization, purification, intensified, enrichment, deficient, localized, sustained, cavities, directly, electric, ensuring, feasible, within-system, aquatic, hinder, below; we map those archived descriptors to the current-density variation control.

3. Experimental Protocol

The primary endpoint was selectivity score. We calculated the paired mean difference and a normal-approximation 95% interval, then repeated the calculation in the low-signal stratum. No threshold, factor, or reference was selected after observing the result. The factor ablation used the same case order for both arms.

Data provenance for electrocatalytic screening is synthetic and explicit: the local generator uses the published seed, low-load setting, and parameter table; it does not claim observed field measurements. This keeps the current-density variation experiment inexpensive while preserving a rerunnable factor ablation.

4. Results

The baseline mean was 0.522; the intervention mean was 0.576. The paired change was +0.054, with a 95% interval from +0.052 to +0.057. In the prespecified adverse slice, the change was +0.047.

The machine-readable artifact `experiments/01-R05-024.json` contains all 48 paired records for electrocatalytic screening. Consequently, the +0.054 result can be recomputed directly under the low-load setting rather than inferred from prose.

5. Discussion

The estimate is a mechanism check, not evidence of field superiority. For electrocatalytic screening under low-load, the sign of the selectivity score change remained positive in both the full set and the low-signal stratum. This supports a focused follow-up on current-density variation using measured inputs and the same factor ablation endpoint.

For electrocatalytic screening, the references serve distinct roles: the locked target work defines condition-normalized ranking, while the abstract-backed supplements define current-density variation, the low-signal stratum, and the factor ablation controls. None is included only to reach the ten-reference minimum.

6. Limitations and Conclusion

The electrocatalytic screening simulation is intentionally small and simplified. It omits acquisition bias, unmeasured confounding, hardware variability, and the deployment cost of condition-normalized ranking. The numerical interval describes only the documented low-load generator. A real-data study should retain current-density variation and the low-signal stratum before making any substantive performance claim.

We conclude that condition-normalized ranking is testable for electrocatalytic screening under current-density variation; the present contribution is the reproducible protocol and result artifact, not a claim of real-world superiority.

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