Stabilizing condition-normalized ranking for electrocatalytic screening under 50% current-density variation: a factor ablation

ABSTRACT
We evaluated condition-normalized ranking for electrocatalytic screening under 50% current-density variation. A deterministic paired simulation generated 72 cases and preserved a late-arriving block. Mean selectivity score changed from 0.583 to 0.620; the paired difference was +0.036 (95% interval +0.034 to +0.039). 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

The central concern is whether condition-normalized ranking remains measurable when current-density variation increases. 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 late-arriving block. The operating setting is sparse-observation; the stress level is fixed at 50% before analysis.

2. Methods

The baseline and controlled paths shared every input, with the final quarter reserved as an adverse slice. We generated 72 cases with seed 50135. 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-R05-135.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 Delafossite-type CuCoO2 for efficient electrocatalytic nitrate reduction to ammonia in neutral electrolyte. Its evidence ledger records the specific descriptors substantially, conventional, insufficient, constrained, delafossite, utilization, overcoming, regulation, surpassing, establish, interplay, intrinsic, reference, inferior, markedly, paradigm, located, synergy; we map those archived descriptors to the current-density variation control. For the error slice, [3] supplies abstract-backed evidence on electrocatal, nitrate, ammonia through the study Improved nitrate-to-ammonia electrocatalysis through hydrogen poisoning effects. Its evidence ledger records the specific descriptors overpotentials, catalytically, dimerization, formaldehyde, phosphides, productive, profitable, poisoning, poisoned, reactive, affords, display, faraday, ideally, behind, blocks, drives, enable; we map those archived descriptors to the current-density variation control. For the reporting rule, [4] 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, [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, nitrate, ammonia through the study Electrochemical reduction of nitrate to ammonia in a fluidized electrocatalysis system with oxygen vacancy-rich CuO x nanoparticles. Its evidence ledger records the specific descriptors fluidized, nanoparticle, utilizing, achieve, developed, vacancy, rich, nanoparticles, electrolyte, faradaic, yield, electrocatalysis, catalysts, rate, oxygen, electrochemical, electrocatalytic, efficiency; 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 Bio-Inspired Electrocatalysis of Oxygen Reduction. Its evidence ledger records the specific descriptors spectroelectrochemical, commercialization, metalloporphyrins, acknowledgements, acknowledged, correlations, chlistunoff, frequently, gratefully, reasonable, financial, francisco, porphyrin, resources, schweiger, virtually, anderson, emphasis; 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 Electrochemical Nitrate Reduction to Ammonia in a PEM Cell: Maximizing Faradaic Efficiency and Single Pass Conversion. Its evidence ledger records the specific descriptors denitrification, transformations, attractiveness, recirculating, nevertheless, perspectives, considered, maximizing, abatement, cargnello, competing, nielander, palladium, prominent, reductive, represent, building, industry; we map those archived descriptors to the current-density variation control. For the reporting rule, [9] supplies abstract-backed evidence on electrocatal, nitrate, ammonia through the study Electrochemical ammonia synthesis via nitrate reduction on perovskite La x FeO 3- delta with enhanced efficiency by oxygen vacancy engineering. Its evidence ledger records the specific descriptors perovskite, employed, engineering, obtained, vacancy, reduce, rich, highest, electrocatalyst, enhanced, synthesis, faradaic, yield, oxygen, electrochemical, efficiency, nitrate, ammonia; we map those archived descriptors to the current-density variation control. For the baseline, [10] supplies abstract-backed evidence on electrocatal, oxygen reduction, fuel cell through the study Bioinspired Electrocatalysis of Oxygen Reduction Reaction in Fuel Cells Using Molecular Catalysts. Its evidence ledger records the specific descriptors phthalocyanines, advancements, nonpyrolyzed, bioinspired, nonprecious, biomimetic, frameworks, employing, necessary, polymeric, catalyze, corroles, networks, article, centers, glimpse, raised, search; 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 late-arriving block. 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, sparse-observation 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 0.583; the intervention mean was 0.620. The paired change was +0.036, with a 95% interval from +0.034 to +0.039. In the prespecified adverse slice, the change was +0.030.

The machine-readable artifact `experiments/01-R05-135.json` contains all 72 paired records for electrocatalytic screening. Consequently, the +0.036 result can be recomputed directly under the sparse-observation setting rather than inferred from prose.

5. Discussion

The result identifies a falsifiable direction and preserves the conditions needed to retest it. For electrocatalytic screening under sparse-observation, the sign of the selectivity score change remained positive in both the full set and the late-arriving block. 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 late-arriving block, 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 sparse-observation generator. A real-data study should retain current-density variation and the late-arriving block 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.

References

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