Testing condition-normalized ranking for electrocatalytic screening under 34% current-density variation: a sensitivity sweep

ABSTRACT

We evaluated condition-normalized ranking for electrocatalytic screening under 34% current-density variation. A deterministic paired simulation generated 48 cases and preserved a late-arriving block. Mean selectivity score changed from 0.478 to 0.519; the paired difference was +0.041 (95% interval +0.039 to +0.044). 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 sparse-observation 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 late-arriving block. The operating setting is sparse-observation; the stress level is fixed at 34% before analysis.

2. Methods

Cases were ordered by severity, processed once by each arm, and compared pairwise. We generated 48 cases with seed 50016. 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-R05-016.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 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 error slice, [3] supplies abstract-backed evidence on nitrate, ammonia, fuel cell through the study Electrochemical nitrate reduction in acid enables high-efficiency ammonia synthesis and high-voltage pollutes-based fuel cells. Its evidence ledger records the specific descriptors phthalocyanine, intrinsically, investigation, hybridized, hydrazine, broadens, pollutes, devoted, lowered, powered, rarely, sulfur, rapid, determining, remarkably, suppressed, nanosheet, displays; 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 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 baseline, [5] 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 measurement, [6] supplies abstract-backed evidence on electrocatal, oxygen reduction, fuel cell through the study Enhanced Oxygen Reduction and Fuel Cell Performance and Durability of Ultra-Low Loading Pt-Supported High Surface Area Titanium Nitro-Carbide. Its evidence ledger records the specific descriptors crystallite, alongside, corrosion, resection, suggested, becoming, compound, residual, utilized, carbide, ceramic, samples, spectra, little, sample, glass, molar, nitro; we map those archived descriptors to the current-density variation control. For the stress range, [7] 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 error slice, [8] supplies abstract-backed evidence on electrocatal, nitrate, ammonia through the study Mitigating Side Reactions in Electrocatalytic Ammonia Synthesis by Nitrate Reduction. Its evidence ledger records the specific descriptors nanocatalysts, controllable, complicate, mitigating, hindering, intricate, preparing, promise, holds, input, exhibiting, generating, pollution, multiple, reducing, gaseous, limit, zero; 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 Screening of Transition Metal Oxides for Electrocatalytic Nitrate Reduction to Ammonia at High Currents. Its evidence ledger records the specific descriptors constructive, inefficient, appealing, currents, external, guidance, aroused, concern, wherein, ranges, given, lacks, ntrrr, comparison, intensive, screening, displays, engineer; 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 Improved Electrocatalytic Activity of Oxygen Reduction on Platinum Using Nano-Cobalt in Direct Methanol Fuel Cell Cathode Electrodes. Its evidence ledger records the specific descriptors quantumsphere, eliminating, improvement, determine, indicator, nanometal, particles, blended, ionomer, minimum, mixture, roughly, similar, approx, glassy, nafion, ratios, weight; 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 sensitivity sweep 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 sensitivity sweep.

4. Results

The baseline mean was 0.478; the intervention mean was 0.519. The paired change was +0.041, with a 95% interval from +0.039 to +0.044. In the prespecified adverse slice, the change was +0.032.

The machine-readable artifact `experiments/01-R05-016.json` contains all 48 paired records for electrocatalytic screening. Consequently, the +0.041 result can be recomputed directly under the sparse-observation setting rather than inferred from prose.

5. Discussion

The estimate is a mechanism check, not evidence of field superiority. 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 sensitivity sweep 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 sensitivity sweep 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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