

Six Papers, Six Purposes — the dossiers

Print one set per pair. Cut along the page breaks, or hand out as a stapled set.

These dossiers are constructed teaching material, not reproductions of specific published papers. Titles, counts and abstract text are illustrative and were written for this exercise. Substitute real papers from your own reading if you prefer — keep the same six genres and the same one ambiguous item.

DOSSIER A

Bifunctional Ga-promoted Cu/ZnO/Al₂O₃ catalysts for CO₂ hydrogenation to methanol: activity, stability and the role of interfacial Ga³⁺

Journal name withheld

FIRST LINES OF THE ABSTRACT

Copper-based catalysts remain the industrial standard for methanol synthesis, but their performance under CO₂-rich feeds is limited by rapid deactivation. Here we report a Ga-promoted Cu/ZnO/Al₂O₃ system that retains 91% of its initial space–time yield over 200 h on stream. Combined in situ XAS and DRIFTS measurements identify interfacial Ga³⁺ as the origin of the improved stability.

Word count	Display items	References	Peer reviewed?
7,240	6 figures, 1 table	63	not stated

SECTION HEADINGS, IN ORDER

1. Introduction
 2. Experimental
 - 2.1 Catalyst preparation
 - 2.2 Characterisation
 - 2.3 Activity testing
 3. Results and discussion
 4. Conclusions
- Acknowledgements
- References

DOSSIER B

Room-temperature aqueous Zn–MnO₂ cells exceeding 400 Wh kg^{−1} enabled by an intergrowth cathode

Journal name withheld

FIRST LINES OF THE ABSTRACT

Aqueous zinc batteries are limited by cathode dissolution. We report an intergrowth MnO₂ phase delivering 402 Wh kg^{−1} at 0.2 A g^{−1} with 88% retention after 500 cycles — to our knowledge the highest reported for an aqueous Zn cell at this rate. Full synthetic and electrochemical protocols are provided in the Supporting Information.

Word count	Display items	References	Peer reviewed?
2,410	4 figures	31	not stated

SECTION HEADINGS, IN ORDER

Introduction

Results and discussion

Conclusions

Associated content — Supporting Information

References

DOSSIER C

Alloying strategies for zinc metal anodes: mechanisms, design principles and the road to practical cells

Journal name withheld

FIRST LINES OF THE ABSTRACT

Zinc metal anodes fail through three coupled processes — dendritic growth, hydrogen evolution and passivation. This article surveys alloying approaches reported between 2015 and 2025, organises them by the failure mode they address, and identifies the reporting inconsistencies that currently prevent comparison across studies.

Word count	Display items	References	Peer reviewed?
13,850	11 figures, 4 tables	247	not stated

SECTION HEADINGS, IN ORDER

- 1. Introduction
- 2. Failure modes of the zinc anode
- 3. Binary alloy strategies
- 4. Ternary and high-entropy systems
- 5. Interfacial and coating approaches
- 6. Reporting standards: a proposal
- 7. Outlook
- References

DOSSIER D

A curated dataset of 4,812 electrochemical impedance spectra for lithium-ion cells across five states of health

Journal name withheld

FIRST LINES OF THE ABSTRACT

Electrochemical impedance spectroscopy is widely used for state-of-health estimation, but public datasets are small and inconsistently annotated. This descriptor presents 4,812 spectra collected from 96 commercial NMC811 cells, with the measurement conditions, cell history and fitting parameters recorded for each. The data are released under CC-BY.

Word count	Display items	References	Peer reviewed?
3,980	5 figures, 3 tables	24	not stated

SECTION HEADINGS, IN ORDER

- Background & summary
- Methods
- Data records
- Technical validation
- Usage notes
- Data availability
- References

DOSSIER E

Pilot-scale evaluation of a membrane-based CO₂ capture unit at the Rayong facility: performance, cost and recommendations

Journal name withheld

FIRST LINES OF THE ABSTRACT

This report presents twelve months of operating data from a 500 Nm³ h⁻¹ membrane capture unit. Capture efficiency averaged 84.2% against a design target of 85%. Specific energy consumption exceeded the design basis by 11%, attributed to compressor derating during the hot season. Recommendations for the next installation phase are given in Section 6.

Word count	Display items	References	Peer reviewed?
9,600	18 figures, 9 tables	12	not stated

SECTION HEADINGS, IN ORDER

Executive summary

- 1. Introduction and scope
- 2. Plant description
- 3. Instrumentation and data quality
- 4. Operating results
- 5. Economic assessment
- 6. Recommendations
- 7. Limitations

Appendix A–D

DOSSIER F

Operando synchrotron X-ray absorption study of a Ta₂O₅/BiFeO₃ heterostructure supercapacitor electrode

Journal name withheld

FIRST LINES OF THE ABSTRACT

The charge-storage mechanism of Ta₂O₅/BiFeO₃ heterostructures has been contested. Using operando XAS at the Fe K-edge we resolve the oxidation-state trajectory across a full charge–discharge cycle and show that the reversible capacity originates at the heterojunction rather than in either bulk phase. Experimental details are given in the Supporting Information.

Word count	Display items	References	Peer reviewed?
2,780	5 figures	38	not stated

SECTION HEADINGS, IN ORDER

Introduction

Results and discussion

Conclusions

Supporting Information

References