In-class activity sheets

Efficient literature review and evidence mapping — Soorathep Kheawhom

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Activity 1 — Build a search you could publish

Your own research question. 8 minutes building, 7 minutes reporting.

Step 1 — Your question in one sentence

Step 2 — Three concept blocks, with synonyms

At least three synonyms per block. Include spellings you would not use, the older name, the abbreviation and its expansion, trade and systematic names.

Block	Synonyms, joined by OR
Material or system	
Process or phenomenon	
Property or metric	

Step 3 — The string

Blocks joined by AND. Truncate with *. Quote exact phrases.

Step 4 — Run it, then refine once

Hits before refinement	Hits after ONE refinement

What was the refinement?

Step 5 — The log line

Database · date searched · the full string · the filters · the number of hits.

If you cannot produce this line, your review has no Methods section — and a review without one is an opinion.

The evidence matrix

In pairs. 8 minutes filling the matrix, 7 minutes reporting.

These four abstracts were written for this exercise. They are not real papers, the results in them are invented, and they must not be cited or searched for.

A

Tetramethylurea as an electrolyte additive for dendrite-free zinc anodes

We report that 0.2 M tetramethylurea (TMU) added to 2 M $ZnSO_4$ reorganises the solvation shell of Zn^{2+} and suppresses dendrite nucleation. Symmetric Zn||Zn cells cycled for 1 200 h at 1 mA cm^{-2} and 0.5 mAh cm^{-2} without short-circuit, against 210 h for the additive-free control. Average coulombic efficiency over 400 cycles was 99.4 %. We conclude that urea-family additives offer a general route to dendrite suppression in mild aqueous zinc chemistry.

Stated limitation: Authors note that only symmetric cells were tested and that full-cell performance was not evaluated.

B

Limits of urea-family additives for zinc anodes under practical cycling

Tetramethylurea (TMU) has been proposed as a dendrite suppressant for aqueous zinc anodes. We re-examined 0.2 M TMU in 2 M $ZnSO_4$ at conditions closer to application: 10 mA cm^{-2} and 5 mAh cm^{-2}. Under these conditions TMU-containing cells failed after 180 h, earlier than the additive-free control (240 h), and post-mortem imaging showed coarse, loosely adhered deposits. We attribute the reversal to additive depletion at the interface at high flux and caution against extrapolating low-rate results.

Stated limitation: Single electrolyte concentration; no temperature variation.

C

An ultralong-life zinc anode enabled by a zwitterionic interphase

A zwitterionic surface layer applied to zinc foil produced stable plating and stripping for over 3 000 h in symmetric cells, the longest reported for this chemistry. Voltage hysteresis remained below 40 mV throughout. Cryo-electron microscopy showed a compact, uniform deposit morphology. The approach is simple, scalable and compatible with existing electrode manufacturing.

Stated limitation: None stated.

D

Electrolyte additives for aqueous zinc batteries: a review

We survey additive strategies for aqueous zinc anodes, covering polymers, surfactants, and organic small molecules. Urea-family additives, including tetramethylurea, are shown across multiple reports to reliably suppress dendrite formation and extend cycle life, and we identify them as among the most promising near-term routes to practical zinc anodes.

Stated limitation: Review; no new experimental data.

The matrix

One row per abstract. A claim is one sentence about what is true — not a summary of the paper. If a quantity is not reported, write NONE.

	Claim	System	Conditions	Metric reported	Stated limitation
A					
B					
C					
D					

Question 1 — Where do two rows disagree?

Question 2 — What single experiment would settle it?

Keep this sheet. Assignment 1 asks for a matrix of your own — one row for a paper you choose, plus three neighbours.