

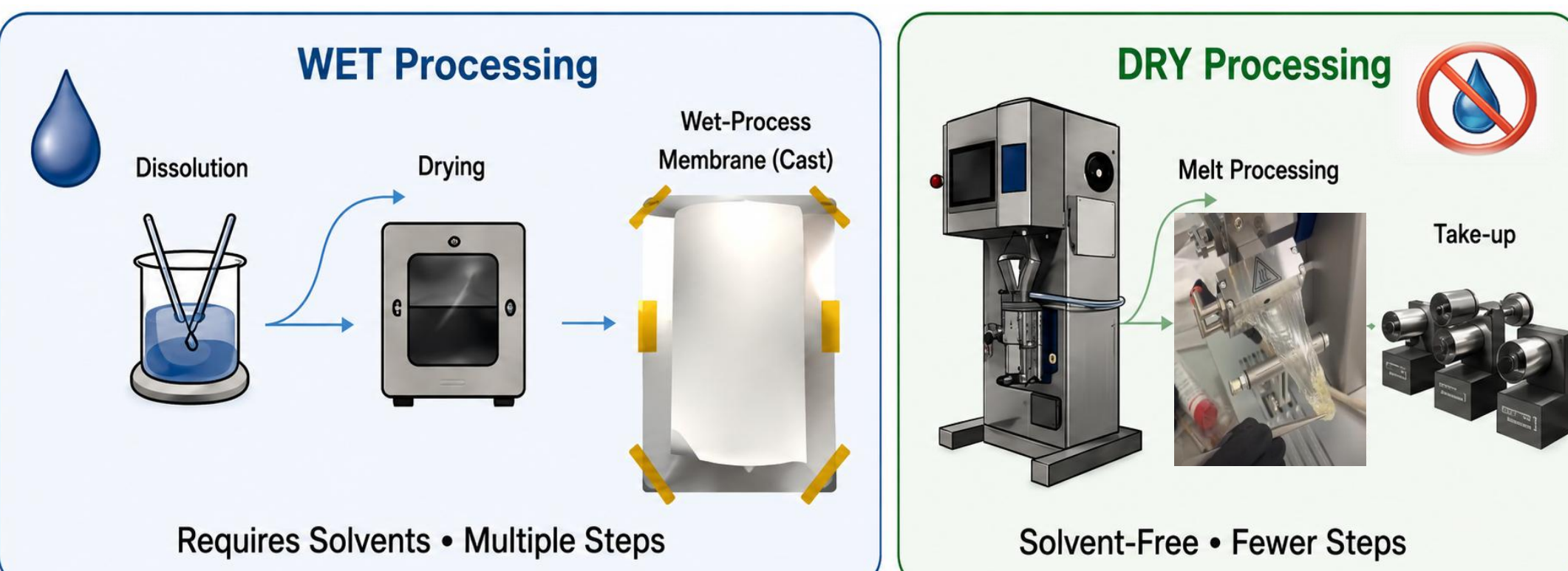
From Wet to Dry Processing: Advanced Solid Polymer Electrolytes for Solid-State Lithium Metal Batteries

WHY NOT DRY?

INTRODUCTION

This work investigates the feasibility of transitioning from conventional wet processing to solvent-free dry manufacturing for solid polymer electrolytes (SPEs). A direct comparison is presented regarding the electrochemical performance of solution-cast versus melt-compounded PEO-based and single-ion hybrid (PMTFSiLi) systems. The results demonstrate that dry processing yields comparable electrochemical behaviour, offering a highly sustainable and scalable pathway for solid-state lithium batteries.

WET vs DRY PROCESSING



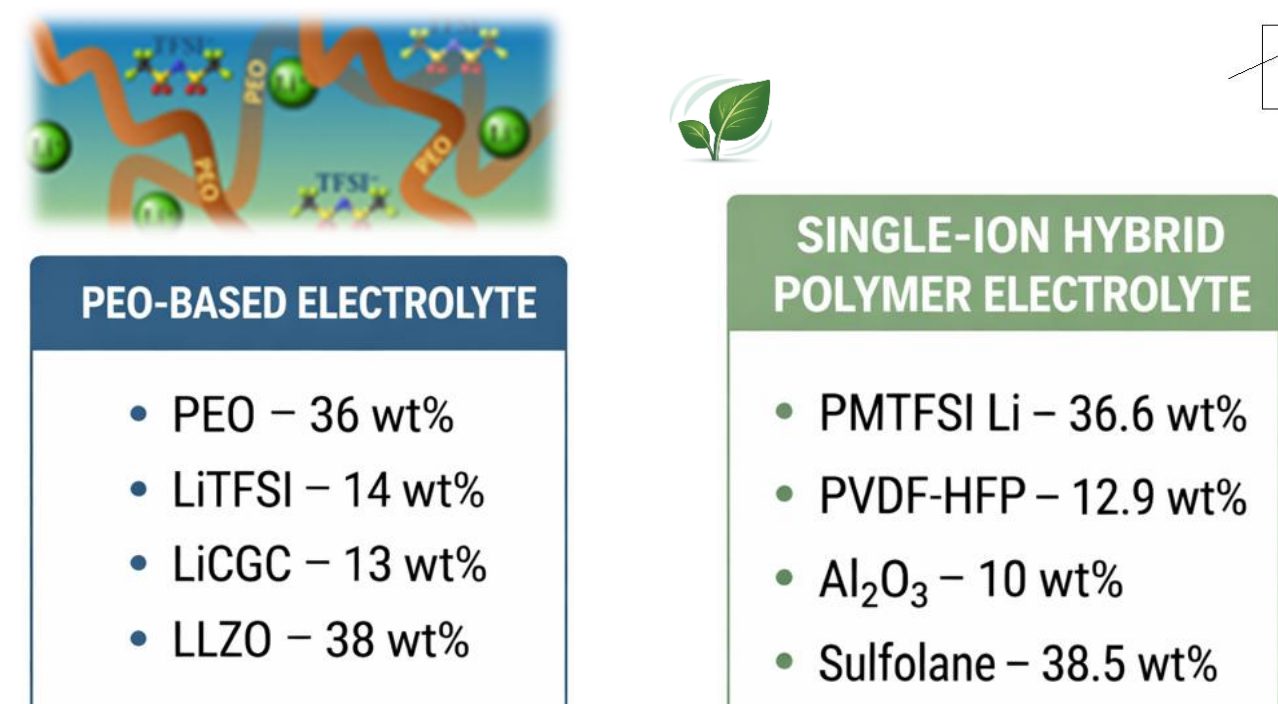
WET PROCESS CHALLENGES



DRY PROCESS BENEFITS



ELECTROLYTE COMPOSITION



The dry process enables the fabrication of both conventional and novel electrolytes.

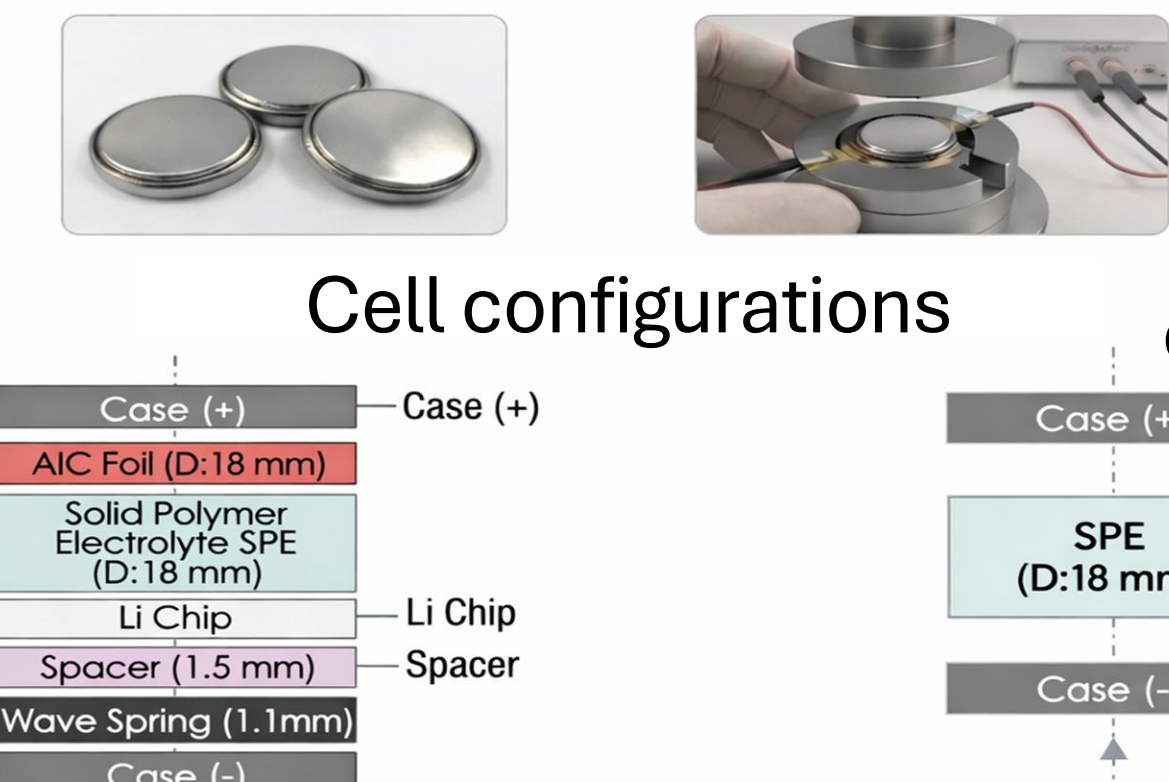
Li | SPE | Li pouch cells



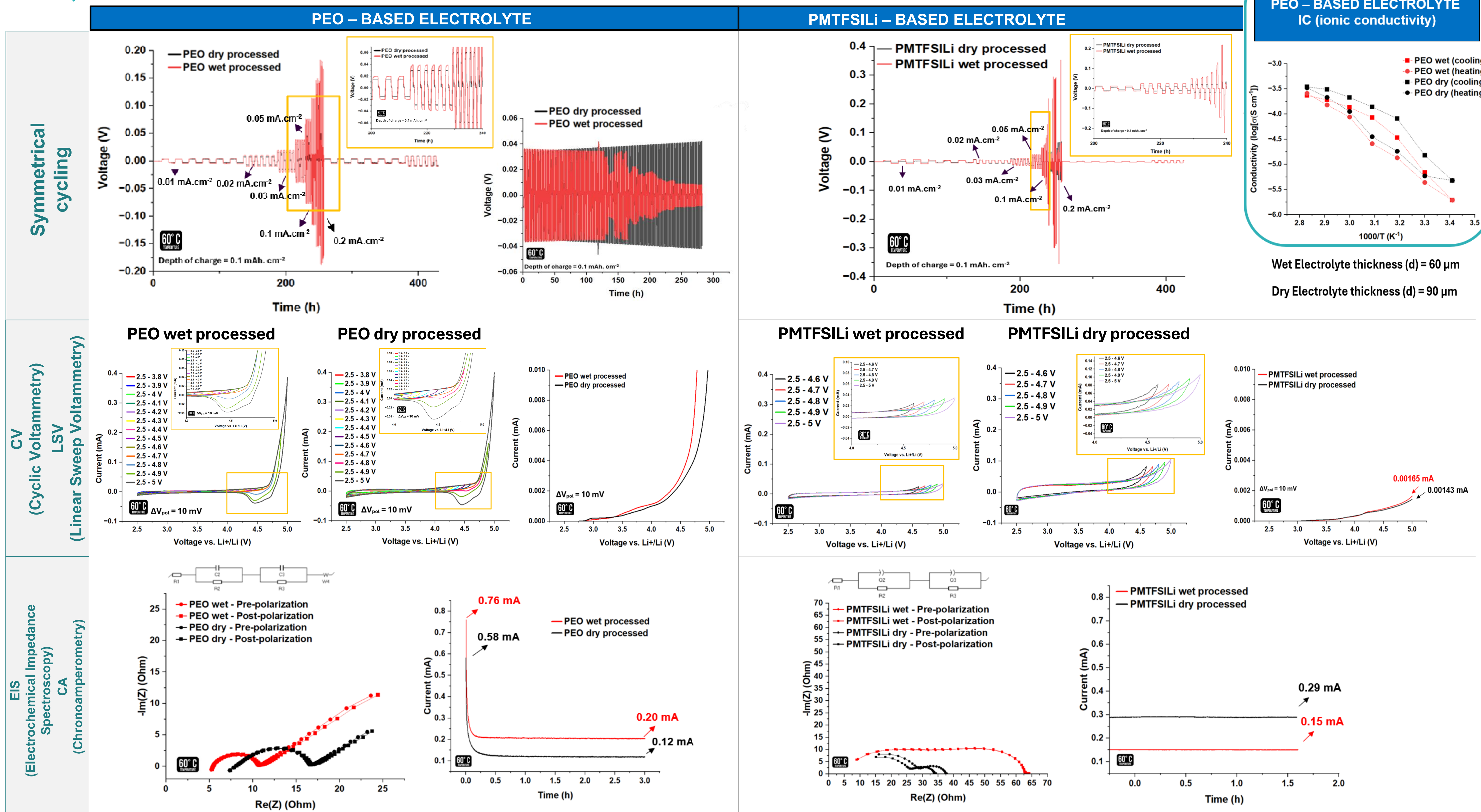
Symmetrical cycling & Transference number

CELLS ASSEMBLY

Coin cells



KEY ELECTROCHEMICAL RESULTS: WET vs DRY



CONCLUSIONS

- Dry-processed SPEs showed electrochemical performance comparable to conventionally wet-processed systems.
- Considering the reduced solvent usage, lower environmental impact, and simplified manufacturing, dry processing represents a promising sustainable alternative for next-generation solid-state batteries.



“If comparable performance can be achieved without solvents, why not focus on dry processing?”



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