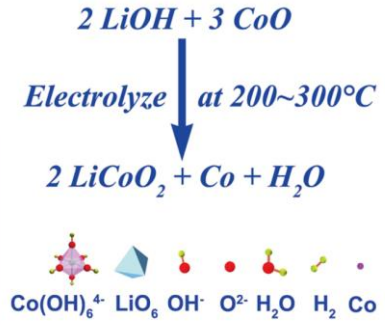
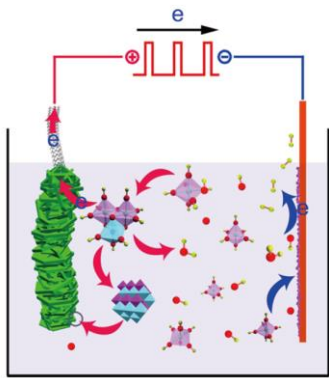
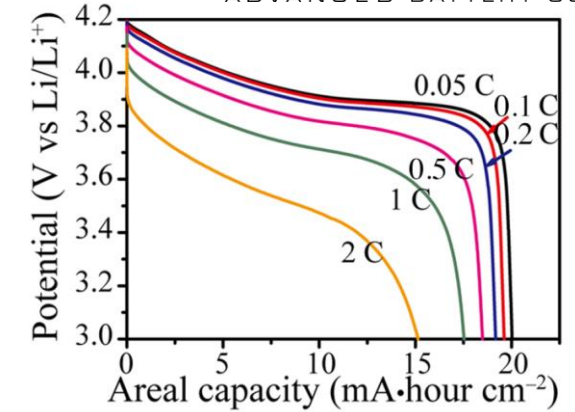
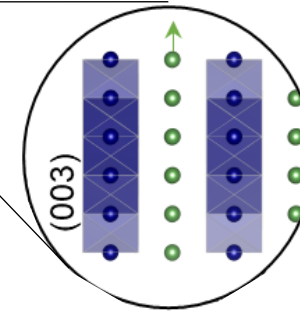


DirectPlate™ LiCoO₂ as a redox membrane for direct electrochemical LiOH extraction from geothermal brine



DirectPlate™
LiCoO₂



Patented electrodeposition process for LiCoO₂ material (Li-ion conducting ceramic membrane)

Zhang et al., Science Advances 2017, 3 (5), e1602427.

LiCoO₂ film is fully dense, crystallographically-oriented and conducts Li⁺ ions with fast kinetics

Zahiri et al., Nature Materials 2021, doi.org/10.1038/s41563-021-01016-0

Extremely fast diffusion of Li⁺ ions in dense, oriented LiCoO₂ evidenced in rate-capability of LiCoO₂-based batteries at high currents (300 μm LCO on carbon)

Key concepts and technological advantages of proposed ideas:

- A redox membrane concept is proposed to directly extract valuable LiOH from geothermal brine using a novel electrochemical process.
- Our concept has the potential to lower energy cost for LiOH production by more than half compared to similar membrane electro dialysis process.
- Xerion's DirectPlate™ process to fabricate dense, oriented LiCoO₂ films is patented and can be made several hundred microns thick with fast Li-ion conduction properties.
- DirectPlate™ LiCoO₂ is a fully dense single-ion conductor (i.e. Li⁺ ions only) with high selectivity and inherently solvent-blocking property (reducing crossover of solvated ions).
- DirectPlate™ LiCoO₂ is formed under corrosive/high-temperature conditions and is expected to withstand harsh conditions of brine electrolysis.
- DirectPlate™ LiCoO₂ is a domestic, US-based technology; it is completely recyclable and can be re-manufactured efficiently.