Facile and novel $LiAlO_2$ film electrodes for energy efficient Li recovery from seawater reverse osmosis (SWRO) brine

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Undergraduate Students
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Introduction

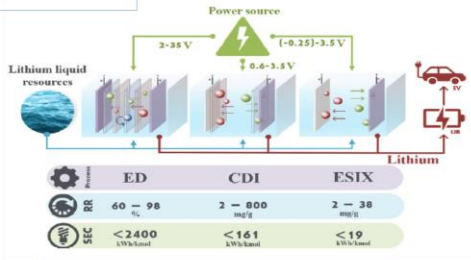
Market demand for Li is high and growing
Current approach is time consuming and geographically confined

Proposed work replaces:

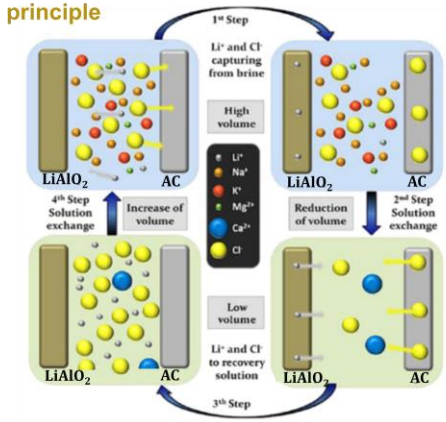
solar drying of salt-lake brine

electrically switched ion exchange (ESIX)

SWRO brine



Li capture and release cycle: operating principle



Experimental Approach

- Synthesis of $LiAlO_2$ by sol-gel method followed by two steps annealing
- Confirmation of crystal structure
- Implementation in 2 electrode system with AC counter electrode
- Use of simulated concentrated SWRO brine Li rich resource
- Use of $CaCl_2$ and KCl as recovery solution

Results and Discussion

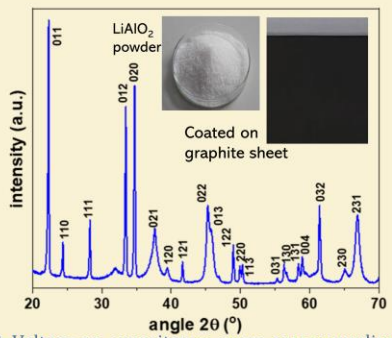


Figure 1. XRD pattern confirming novel $LiAlO_2$ crystal structure

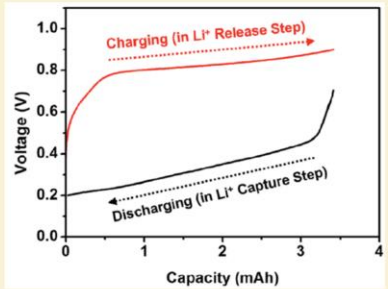


Figure 2. Voltage vs capacitance curve corresponding to Li capture and release half cycles

Conclusion

XRD and XPS confirms $LiAlO_2$ catalyst was fabricated with high degree of crystallinity
At 0.5 $mA.cm^{-2}$, purity of Li recovered is 97%
Specific energy consumption of Li recovery is 100 W.h/mol

Acknowledgment

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