

# In-situ Observation of Anion Reaction in Al Ion Batteries

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## Abstract

Developing new earth-abundant materials has been attracted more and more attention for energy storage applications. In this talk, I would like to talk about our recent work related to development of Aluminum ion battery (AIB). AIB was demonstrated recently based on Al foil anode, graphite cathode and ionic liquid electrolyte. Much remains to be done to increase the cathode capacity and to understand details of the anion-graphite intercalation mechanism. Here, we developed an expanded graphite (EG) film as AIB cathode. The specific capacity and Coulombic efficiency of the battery was achieved ~140 mAh/g and ~98% respectively, at a current density of 1500 mA-g<sup>-1</sup> with clear discharge voltage plateaus ~2.2V and 2.0V. The cycle stability of the battery exceeded 8000 cycles. Raman spectroscopy, X-ray diffraction, X-ray photoelectron spectroscopy and X-ray absorption spectroscopy data elucidated chloroaluminate intercalation in natural graphite and origination of storage capacity of anions. Finally, in-situ SEM measurement were employed to real-time investigate the structure change of graphite during battery operation.

**Keyword:** Aluminum ion battery, Flexuous graphite, Intercalation, In-situ XRD analysis, In-situ SEM analysis

## References

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