

Supporting Information

Aluminum Alloy Anode with Various Iron Content Influencing the Performance of Aluminum-Ion Batteries

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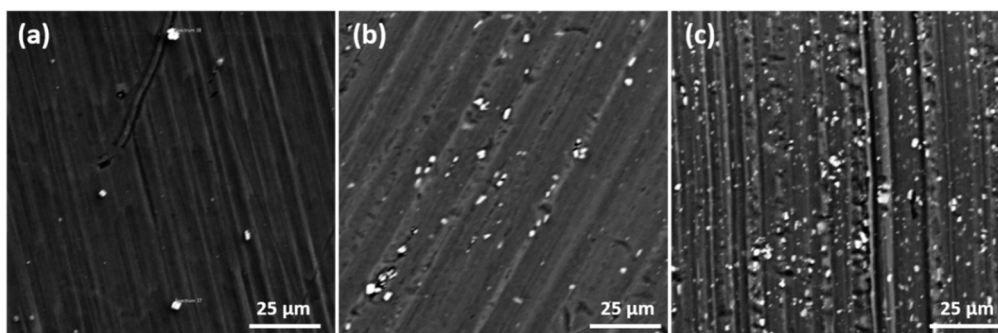


Figure S1. SEM backscattered images of Pristine Al surfaces shown in Fig 2 from a higher magnification revealing particles: (a) 99.99% Al, (b) 99.5% Al 0.5%Fe, (c) 99% Al 1% Fe.

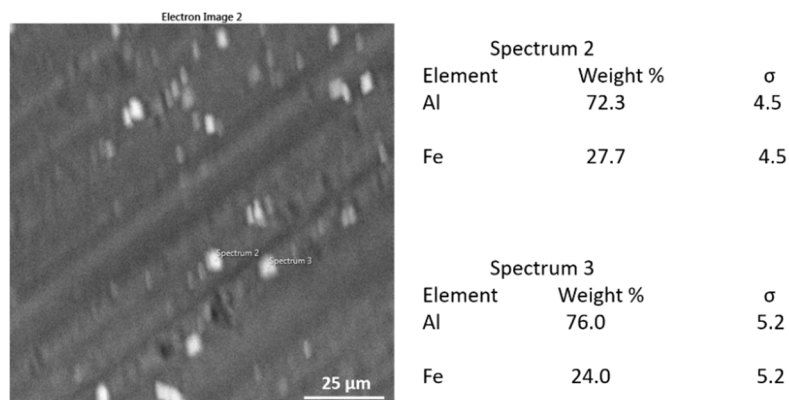


Figure S2. EDX analysis of particles precipitated in pristine Al matrix.

As could be seen in Fig.S3, the peak intensities corresponding to Al_3Fe phases are significantly smaller compared to the Al matrix ($\alpha\text{-Al}$). This is due to the very small amount of such phases compared to the Al matrix [1,2].

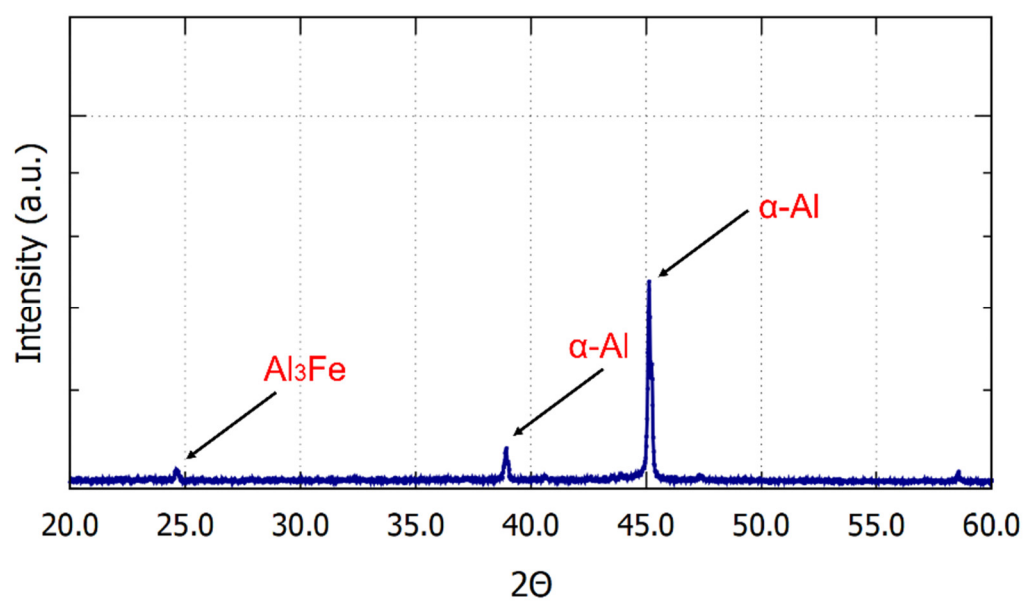


Figure S3. Spectrum from X-ray diffraction performed on pristine 99%Al 1%Fe alloy.

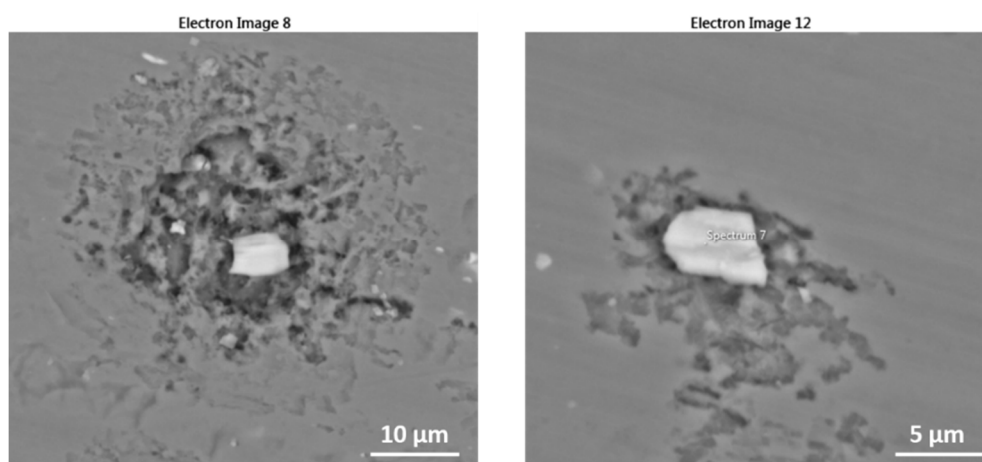


Figure S4. SEM images of corrosion sites in Al matrix around Al₃Fe particles in different locations after 1 st charge–discharge cycle.

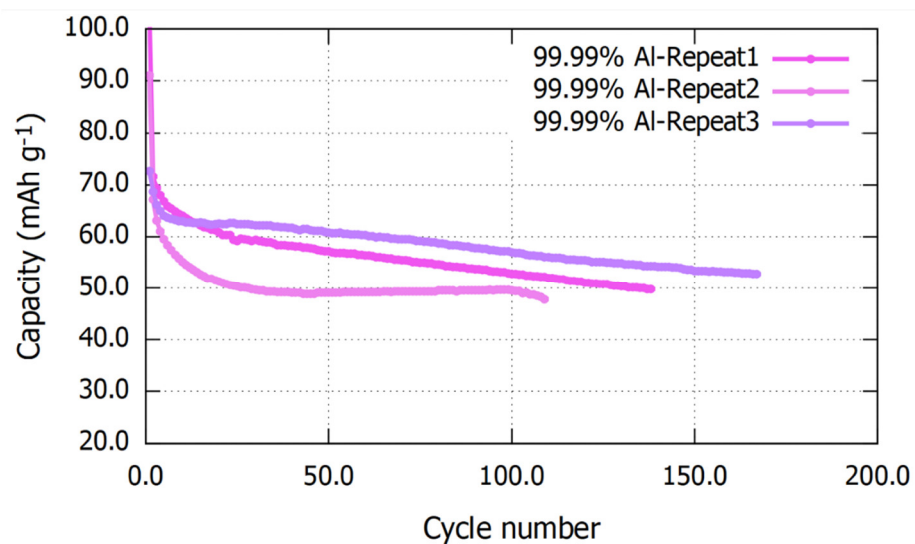


Figure S5. Cycling performance of Al-NG battery using 99.99% Al anode at a current density of 0.5 A g^{-1} showing reproducibility of capacity profiles.

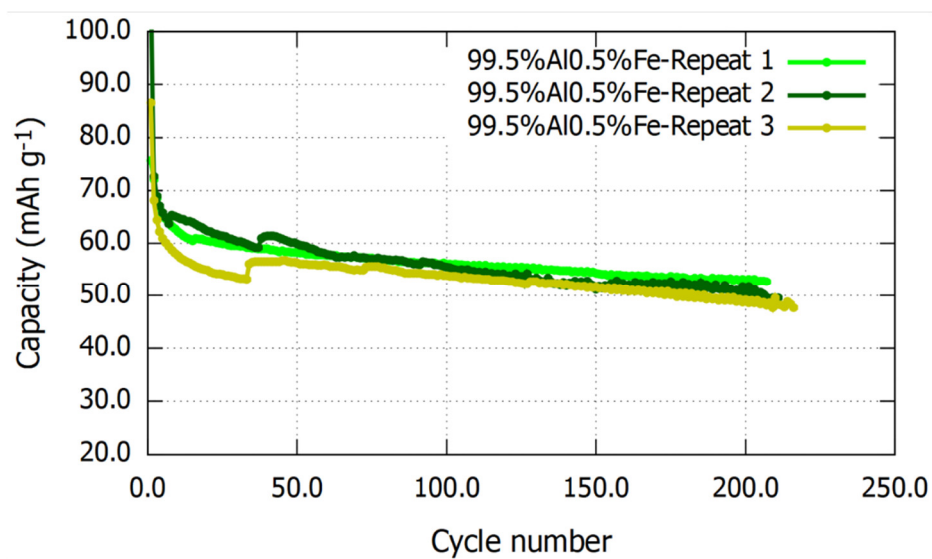


Figure S6. Cycling performance of Al-NG battery using 99.5% Al alloy anode at a current density of 0.5 A g^{-1} showing reproducibility of capacity profiles.

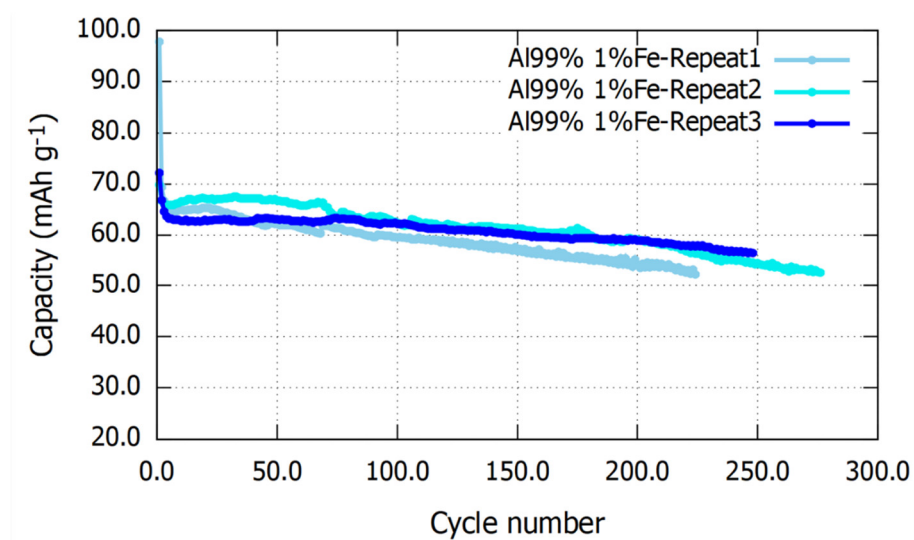


Figure S7. Cycling performance of Al-NG battery using 99% 1%Fe Al alloy anode at a current density of 0.5 A g^{-1} showing reproducibility of capacity profiles.

References

- [1] Basariya, M. R., Roy, R. K., Pramanick, A. K., Srivastava, V. C., & Mukhopadhyay, N. K. (2015). Structural transition and softening in Al-Fe intermetallic compounds induced by high energy ball milling. *Materials Science and Engineering: A*, 638, 282-288.
- [2] Bendjeddou, L., Debili, M. Y., Fekrache, A., & Boukhessaim, S. (2009). Structure and phase transformation in HF melted Al-Fe-Ti alloys. *Physics procedia*, 2(3), 1113-1118.