Supporting Information

Mechanistic insights into the solvent assisted thermal regeneration of spent graphite and its upcycling into Dual graphite battery

Shuvajit Ghosh[1], Madhushri Bhar[1], Udita Bhattacharjee[1], Kali Prasad Yalamanchili[2], Satheesh Krishnamurthy[3], Surendra K. Martha[*,1]*

[1]Department of Chemistry, Indian Institute of Technology Hyderabad, Kandi, Sangareddy, 502284, Telangana, India.

[2]Nile Limited, Lot No.24 A/A, MLA Colony. Road No.12, Banjara Hills, Hyderabad, India.

[3]School of Engineering & Innovation, The Open University, Walton Hall, Milton Keynes MK7 6AA, UK.

*Corresponding author Email: martha@chy.iith.ac.in

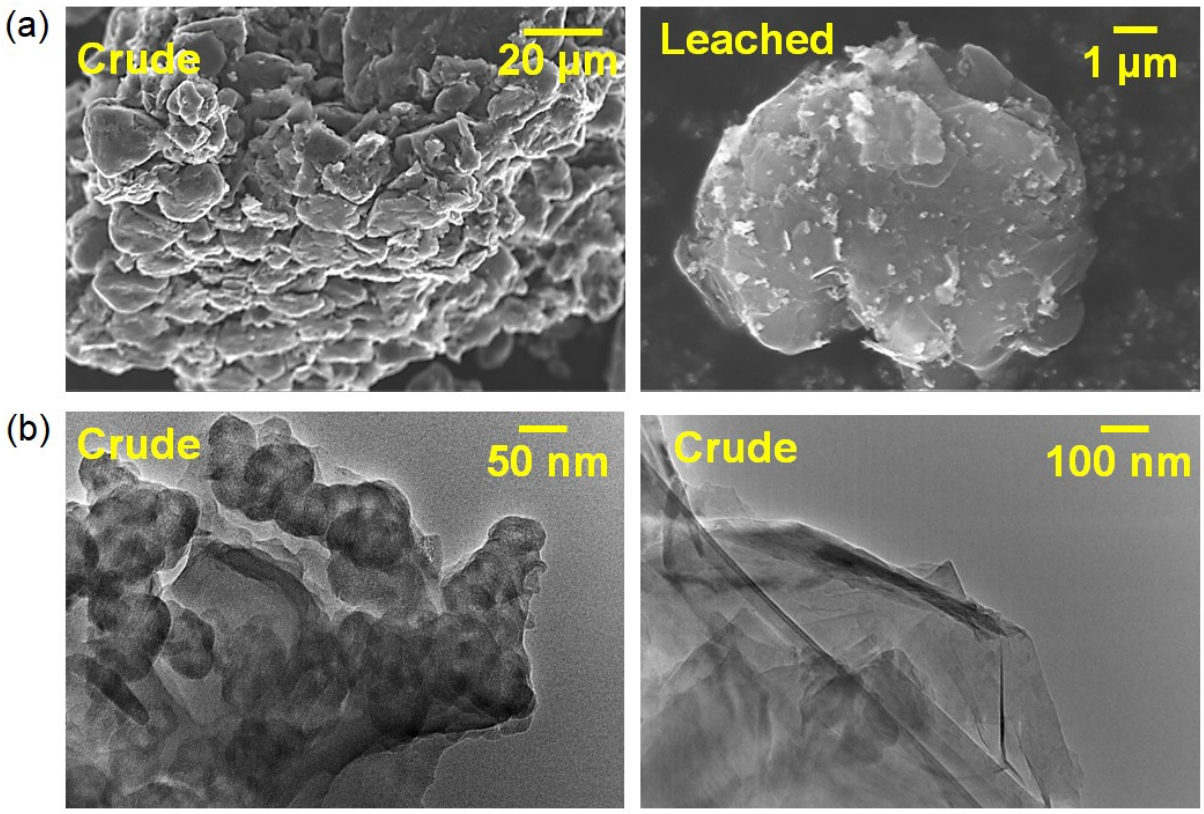

Figure S1. a) SEM images of crude and leached samples. b) TEM images of crude and leached samples.

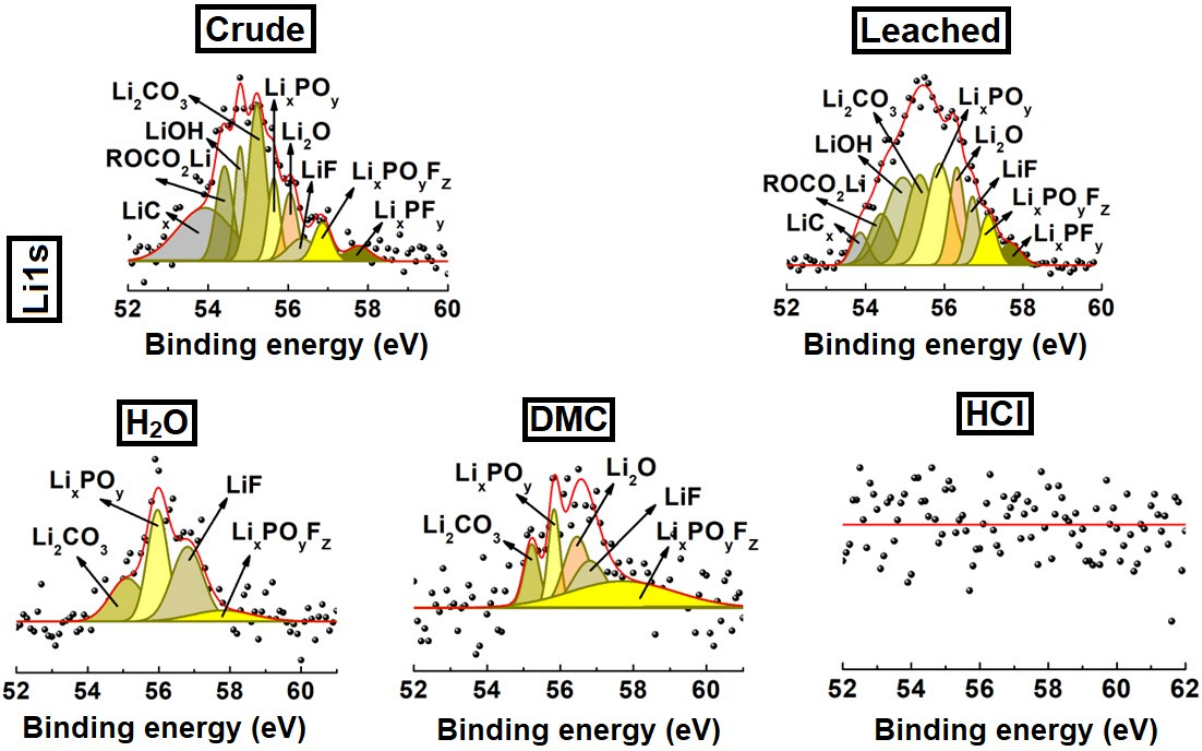

Figure S2. Li1s spectra of crude, leached, and solvent assisted thermally treated graphite samples.

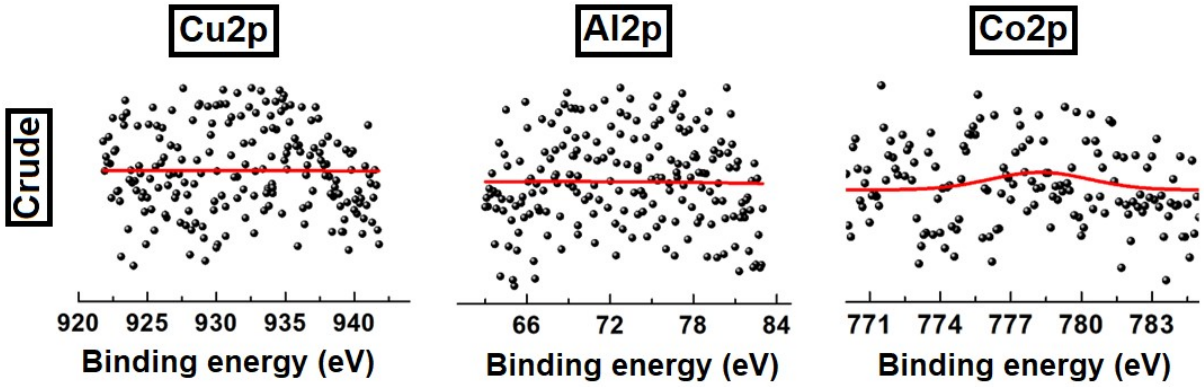

Figure S3. Cu2p, Al2p and Co2p spectra of recovered sample.

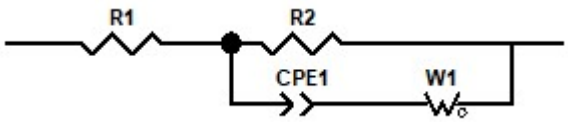

Figure S4. Equivalent circuit to decouple resistance values. R, CPE, and W refer to resistance, constant phase, and Warburg elements, respectively. R1 signifies solution resistance (Rs). (R2 and CPE1) combinedly represents the the semicircle. R2 signifies the combined ressitances of EEI crossing and charge transfer.

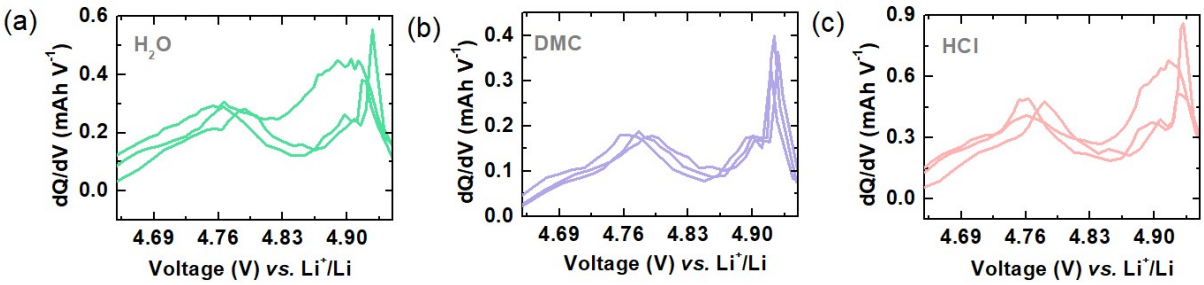

Figure S5. Variation in differential capacity profilies of selected cycle between 1-30th. a) H_2O-treated cathode at 2nd life, b) DMC-treated cathode at 2nd life, and c) HCl-treated cathode at 2nd life.

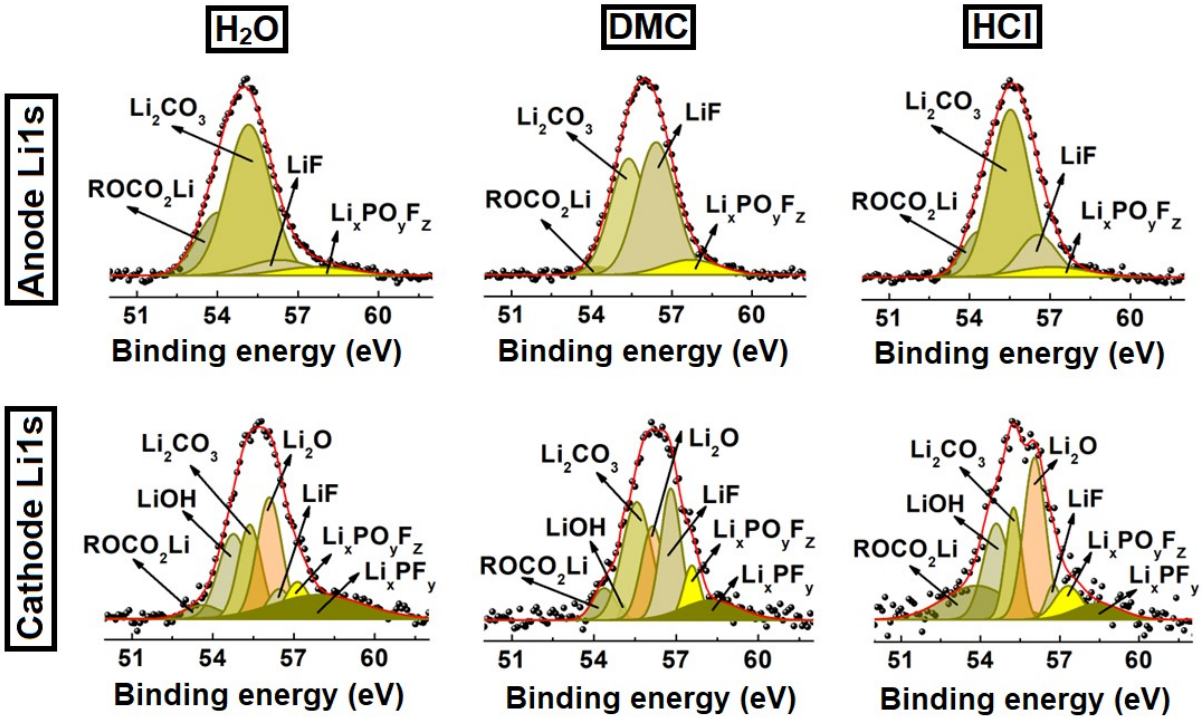

Figure S6. Li1s spectra of H_2O, DMC, and HCl treated samples at 2nd life as both cathode and anode.

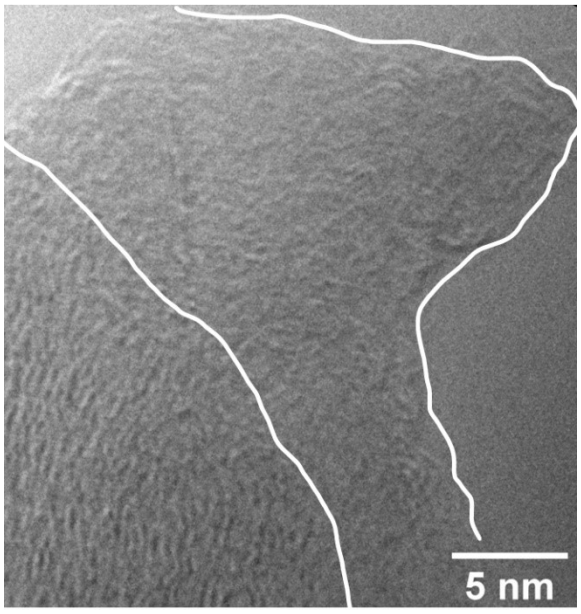

Figure S7. HRTEM image of H_2O-anode after initial formation cycles at 2nd life.

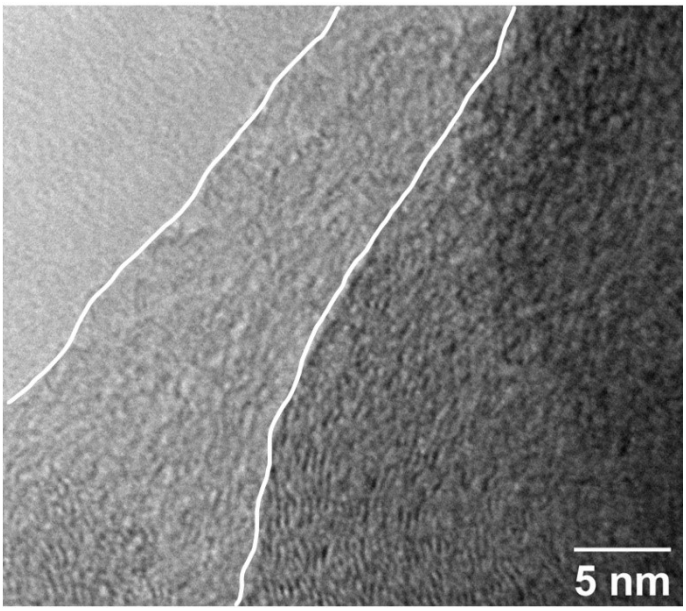

Figure S8. HRTEM image of DMC-anode after initial formation cycles at 2nd life.

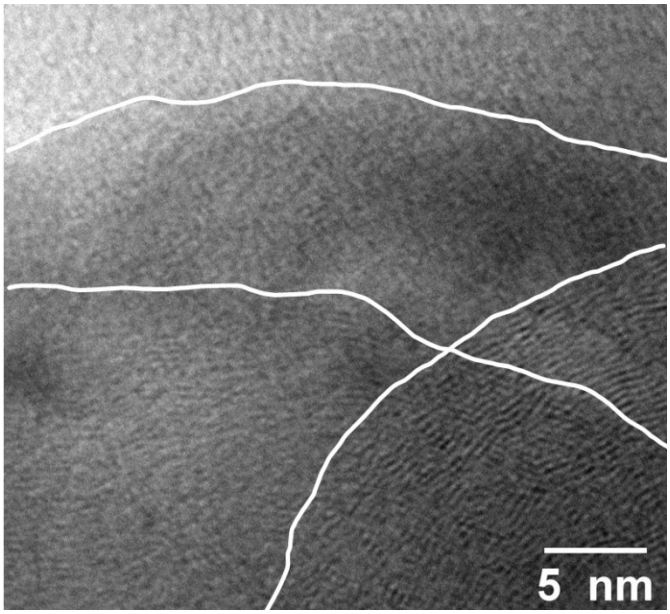

Figure S9. HRTEM image of HCl-anode after initial formation cycles at 2nd life.