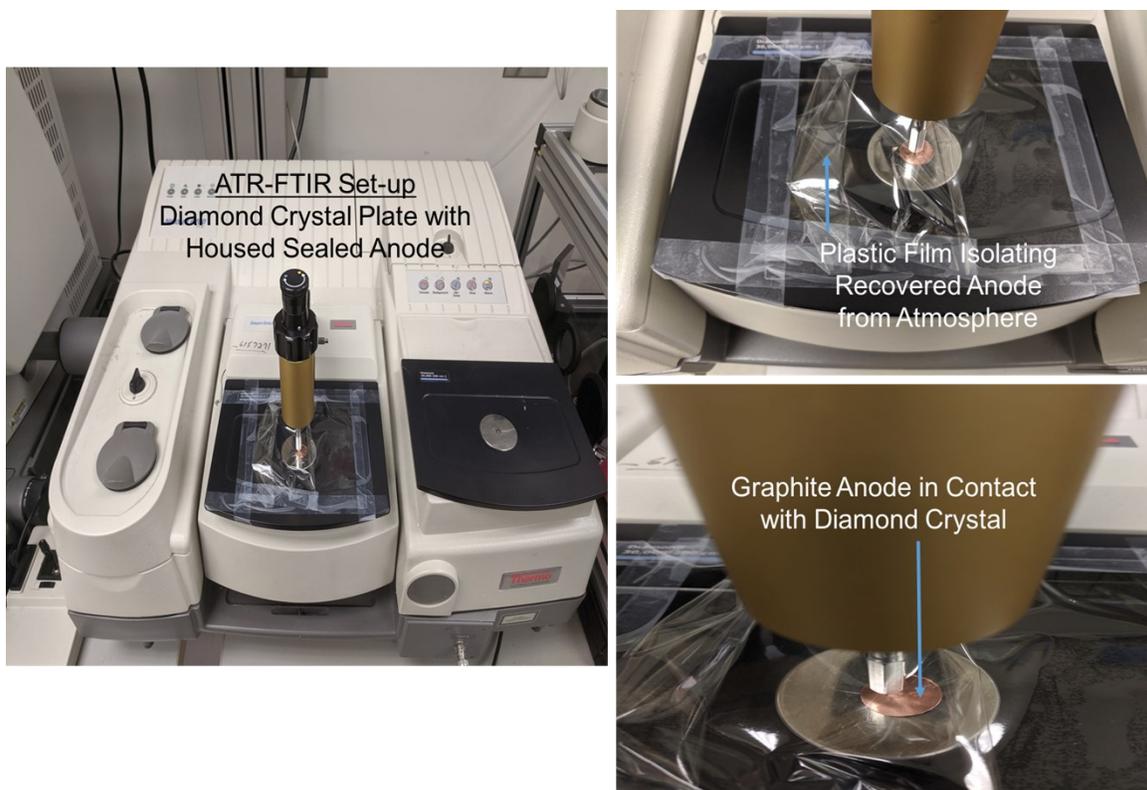


## Safe Li-ion Batteries Enabled by Electrode-coated Zeolite Separators

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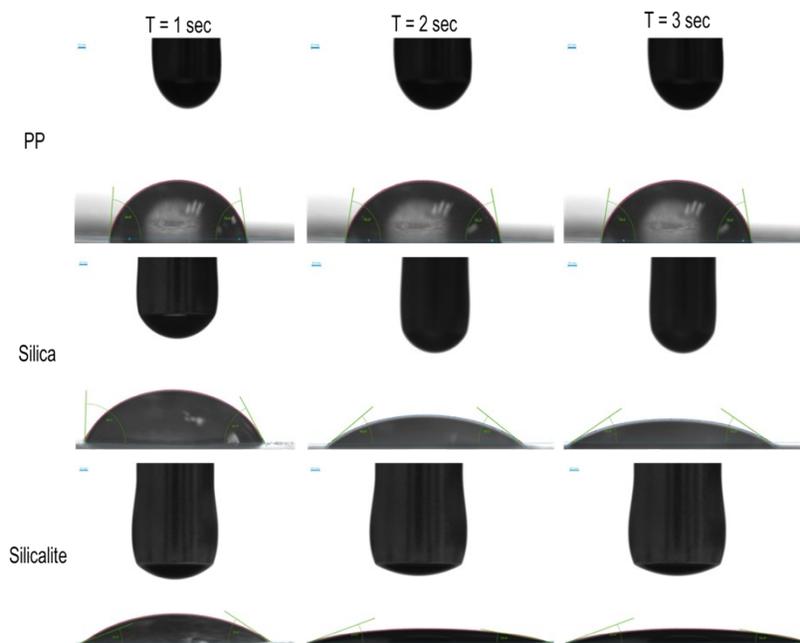
### Supplementary Information



**Fig. S1** ATR-FTIR set-up for analyzing the formed SEI on the graphite anode. The recovered graphite anode from the cycled full-cell is sealed on the FTIR diamond crystal plate within the argon atmosphere glovebox to prevent any exposure of the anode to the atmosphere during sample preparation and the ATR-FTIR experiment.

**Fig. S1** shows the set-up used to characterize the SEI on the graphite anode. The graphite anode was extracted from the coin-cell in the argon atmosphere glovebox and then sealed onto the FTIR diamond crystal plate with the SEI side of the anode facing the diamond crystal. This direct contact with the diamond crystal is essential for the ATR-FTIR technique used for the characterization which results in the signal coming majorly from the surface of the anode and not the graphite matrix. Thus, the ATR-FTIR method improves the signal to noise ratio to get a

characteristic peak which represents the LiF (lithium fluoride) concentration in the SEI and thus indirectly provides information on the thickness and density of the SEI.



**Fig. S2** Wettability of standalone PP and, silica and silicalite separators which are coated on a dense aluminum sheet, as measured by sessile drop test using 5.3 M LiFSI/TMP salt-concentrated electrolyte as the dropping liquid

**Fig. S2** shows the contact angle change with respect to time on the standalone PP and, silica and silicalite separator which are coated on a dense aluminum sheet. We can see that the spreading of the 5.3 M LiFSI/TMP electrolyte is much faster on the silicalite and the silica separators due to their respective high surface energies, as compared to the PP separator. Whereas, the drop of the electrolyte on the PP separator does not show a significant wetting/contact angle change indicating the requirement of a larger wetting time for the separator. It is also interesting to see that in the case of the silica and silicalite separators, which have a similar particle size, morphology and film thickness. Silicalite separators still show a greater wettability compared to the silica separator due

to the intra-particle pores of the silicalite separator, which also translates to its higher surface energy.