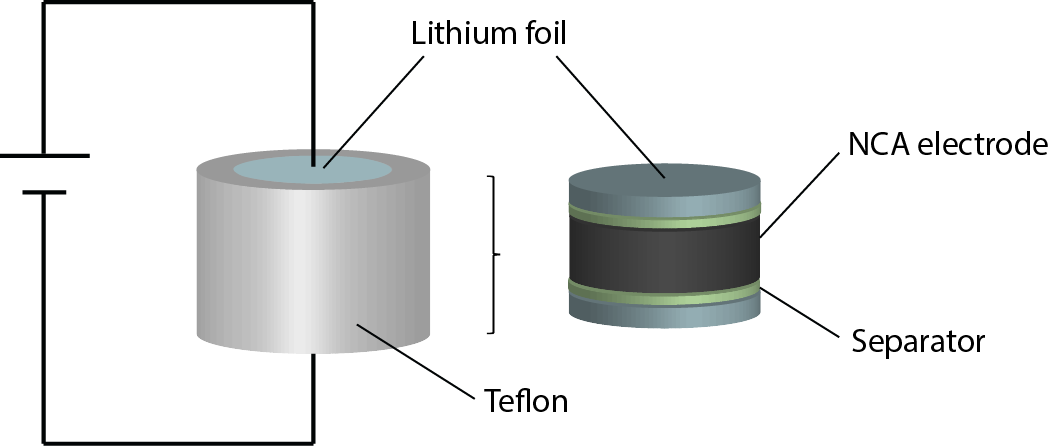
Supplementary Material

**Impact of Pore Tortuosity on Electrode Kinetics in Lithium Battery Electrodes: Study in Directionally Freeze-Cast LiNi0.8Co0.15Al0.05O2 (NCA)**

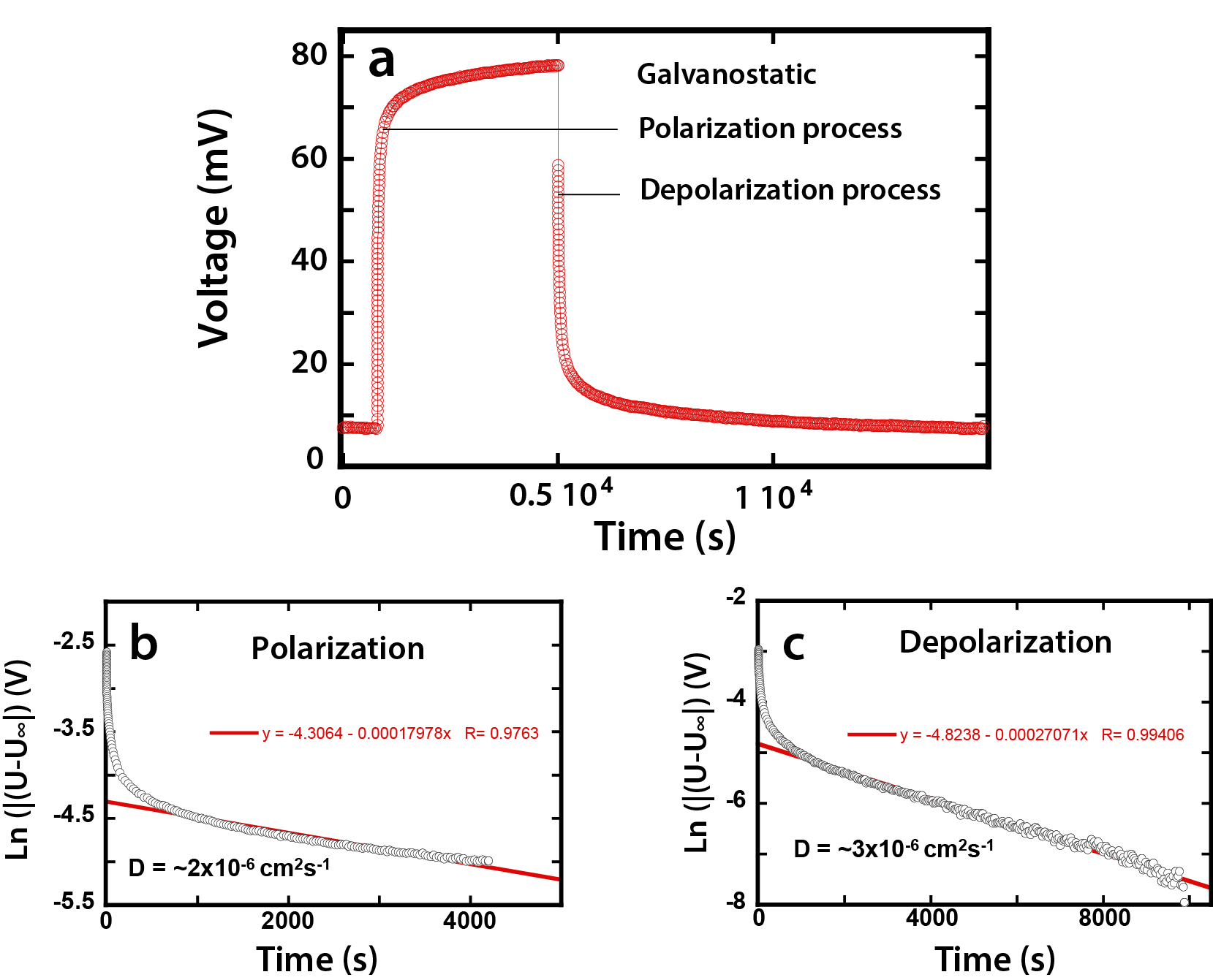
Benjamin Delattre, Ruhul Amin, Jonathan Sander, Joël De Coninck, Antoni P. Tomsia, and Yet-Ming Chiang\*



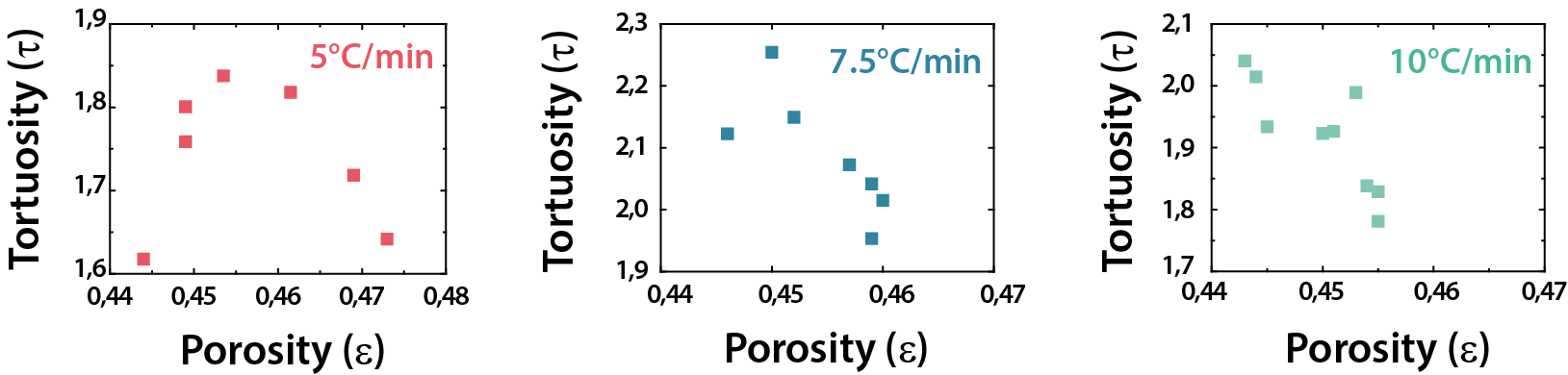
**Figure S1.** Cell configurations for the measurements of the electrolyte conductivity and diffusivity with and without separator.



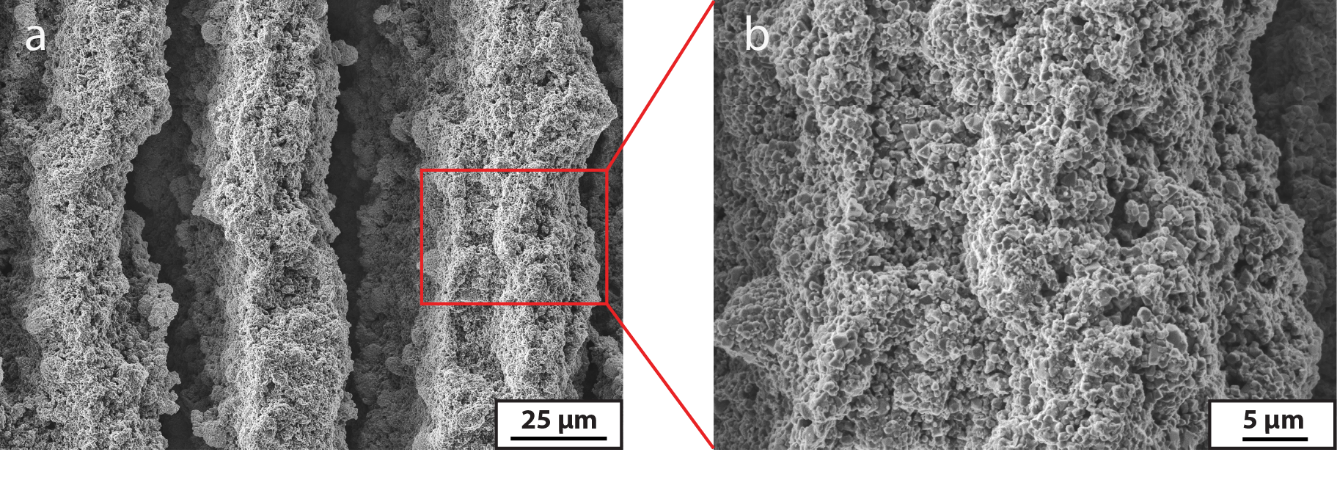
**Figure S2.** Cell configuration for the determination of diffusivity of a freeze-cast NCA sample soaked with liquid.



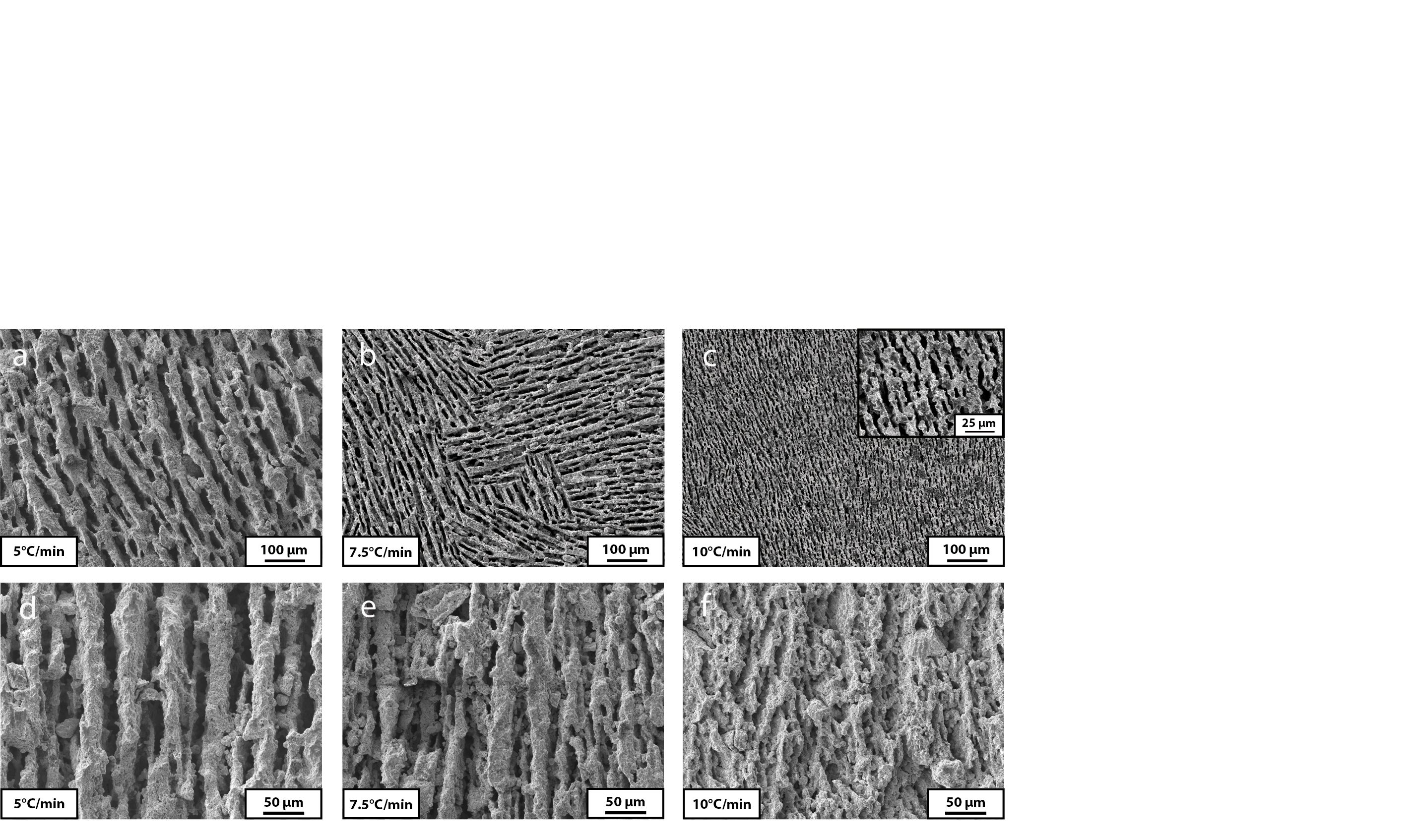
**Figure S3.** Voltage profile of polarization-depolarization process in the electrolyte solution. The fit of vs. time allows determining the diffusivity.



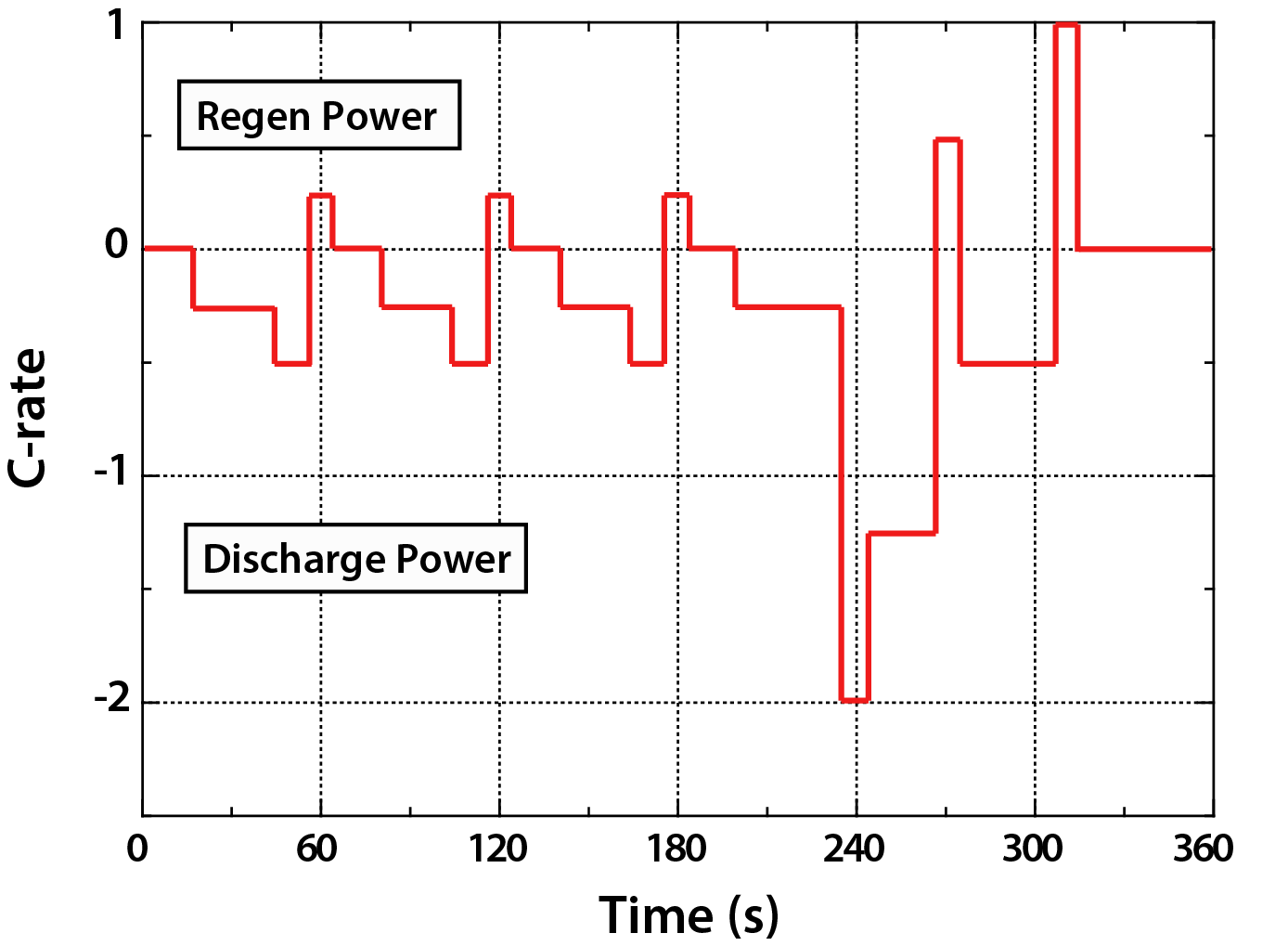
**Figure S4.** Statistical dispersion of the tortuosity-porosity measurements (at least three different samples for a given cooling rate) calculated from thermal diffusion simulations.



**Figure S5.** SEM images of a NCA microstructure obtained from a 30 vol.% slurry frozen at 5°C/min. (a) View showing the global alignment of the walls. (b) Close-up view of a single wall (2500x magnification) showing the thick and very dense wall structure.



**Figure S6.** NCA electrode microstructures obtained from a 35 vol.% slurry with cooling rates of 5, 7.5, and 10°C/min. SEM images showing the cross-sections perpendicular to (a–c) and parallel (d–f) with the freezing direction.



**Figure S7.** C-rate versus time profile for the USABC dynamic stress test (DST).