

Article

Cellulose-multiwall carbon nanotube fiber actuator behavior in aqueous and organic electrolyte

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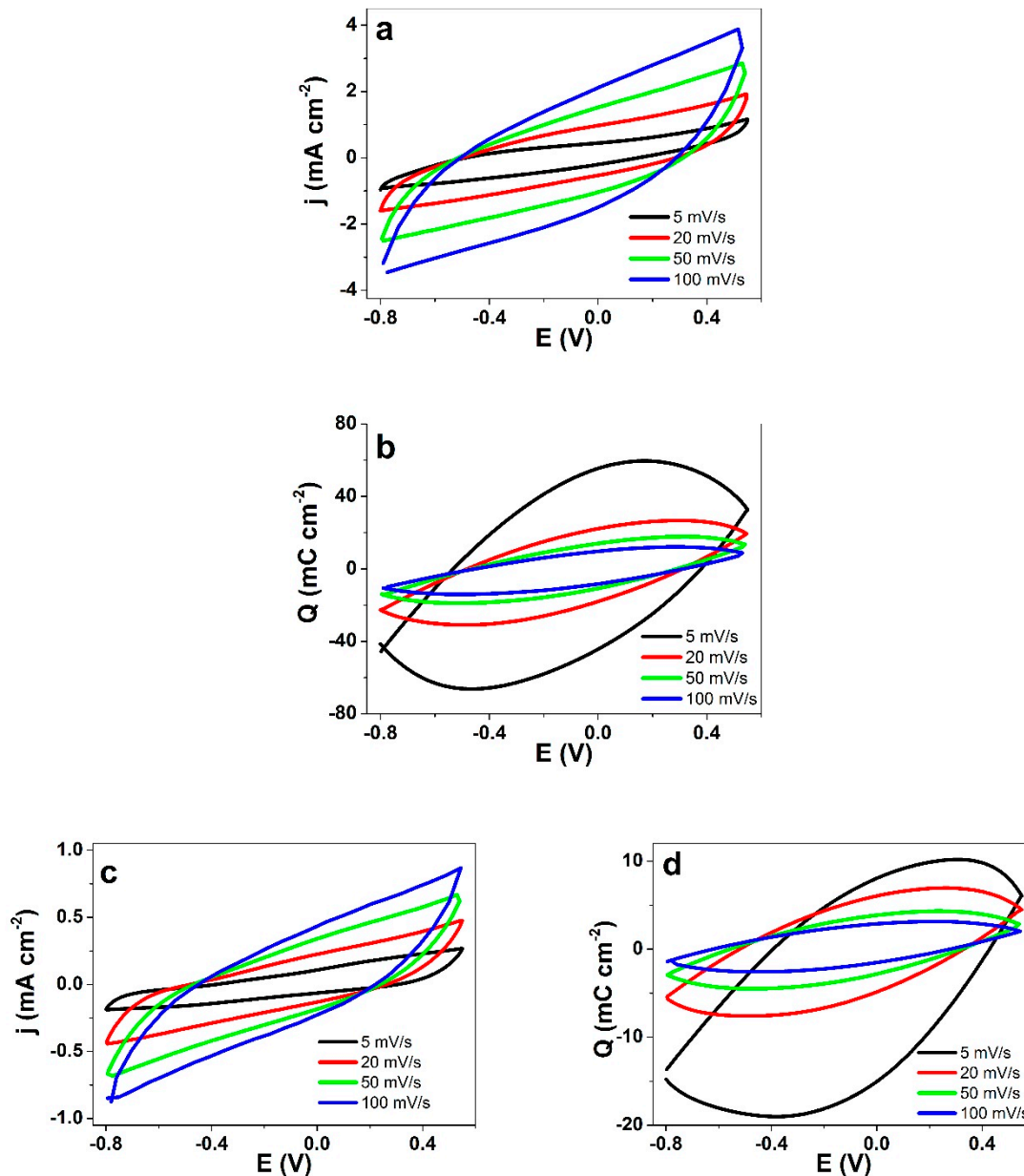


Figure S1. Cyclic voltammetric measurements (3rd cycles) of Cell-CNT fibers (working electrode) at different scan rates (5 mV s⁻¹ (black); 20 mV s⁻¹ (red); 50 mV s⁻¹ (green) and 100 mV s⁻¹ (blue) operated in three-electrode set up with Ag/AgCl (3M KCl) reference electrode and Platinum sheet counter electrode. The current density j of Cell-CNT in LITFSI-aq is shown in (a) and the charge density Q in (b). Cell-CNT in LiTFSI-PC electrolyte shows current density j in (c) and charge density Q in (d) against the applied potential range 0.55V to -0.8V.

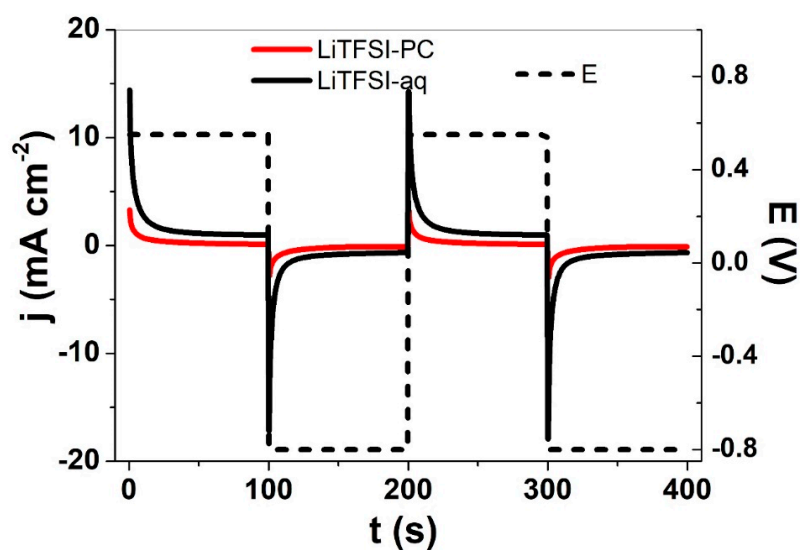


Figure S2. Square wave current density curves (two subsequent cycles: 2nd and 3rd) at applied frequency 0.005 Hz and potential range 0.55 to -0.8 V (dashed line) of Cell-CNT fibers in LiTFSI-PC (red, dotted) and LiTFSI-aq (black, line) against time t .

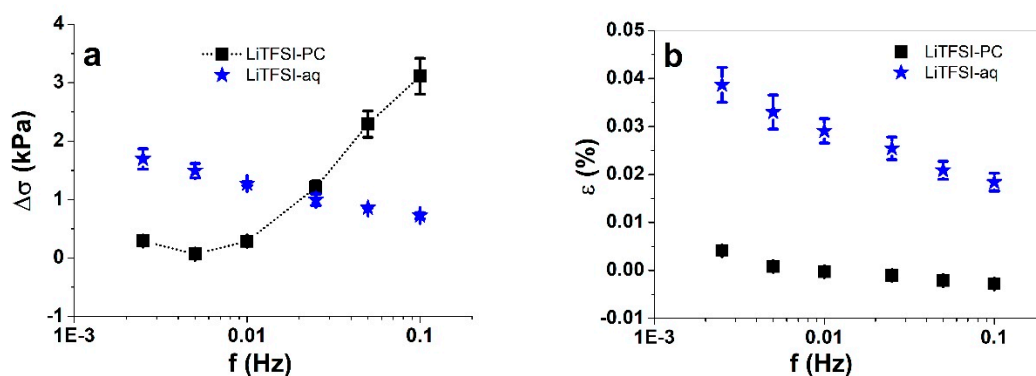


Figure S3. Square wave potential measurements of Cell-CNT fibers in potential range 0.55 to -0.8 V using different solvents PC (■) and aq (★) with same salt LiTFSI showing in a: stress difference $\Delta\sigma$ and in b: strain ϵ against applied frequencies (logarithmic scale).

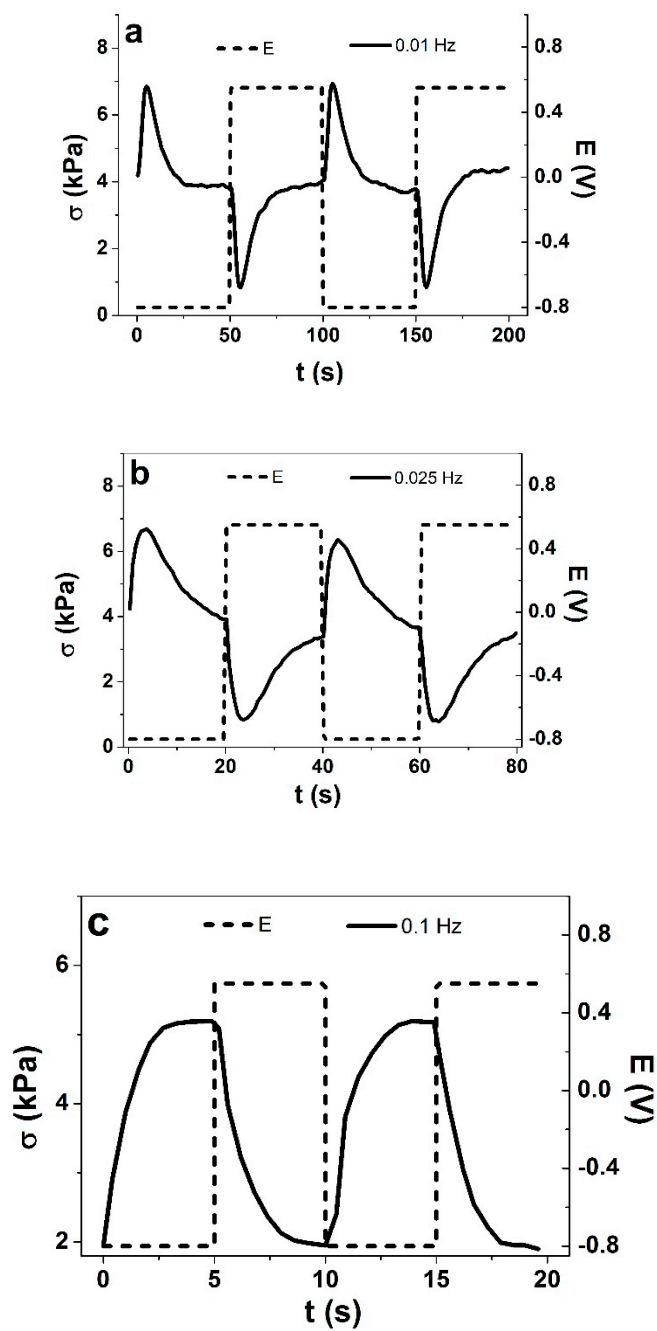


Figure S4. Linear actuation of stress σ (black line, two subsequent cycles 3rd and 4th) at applied square wave potential measurements of Cell-CNT fibers in potential range 0.55 to -0.8 V (E , dashed line) against time t in LiTFSI-PC at different frequencies of a: 0.01 Hz, b: 0.025 Hz and c: 0.1 Hz.

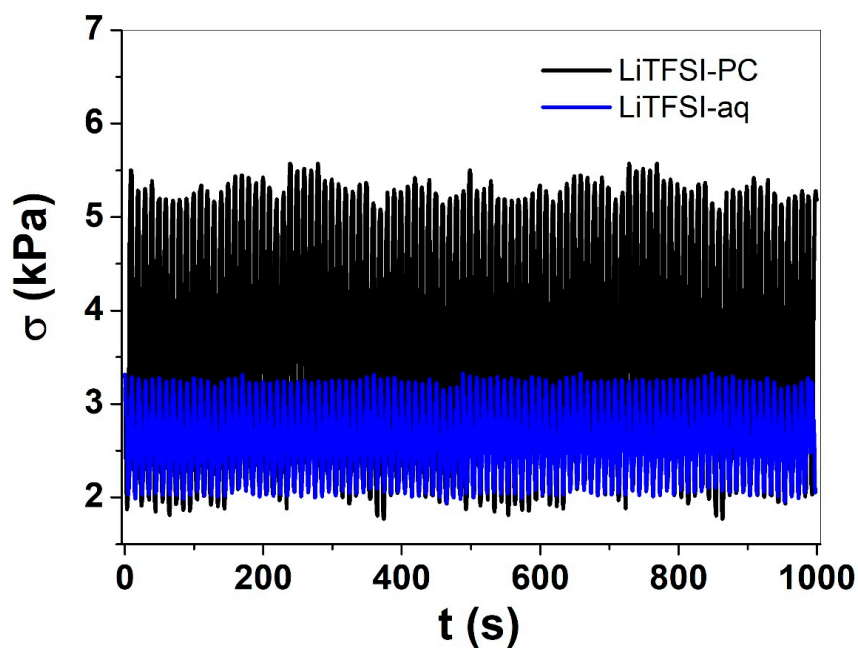


Figure S5. Square wave potential steps (0.1 Hz frequency) of Cell-CNT fibers in LiTFSI-PC (black line) and in LiTFSI-aq (blue line) revealing stress σ against time t .

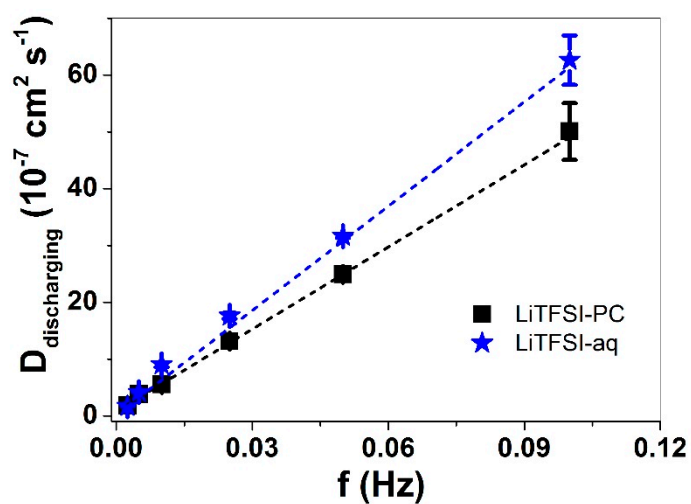


Figure S6. Diffusion coefficients D in Cell-CNT fibers in LiTFSI-PC (■) and LiTFSI-aq (★) electrolytes against frequency upon discharging. The linear fits (dashed) are shown here only for orientation.