

Supporting information

Influence of the Backbone Chemistry and Side-chain Spacer Flexibility in Sodium Single-Ion Polymer Electrolyte for Sodium-Batteries

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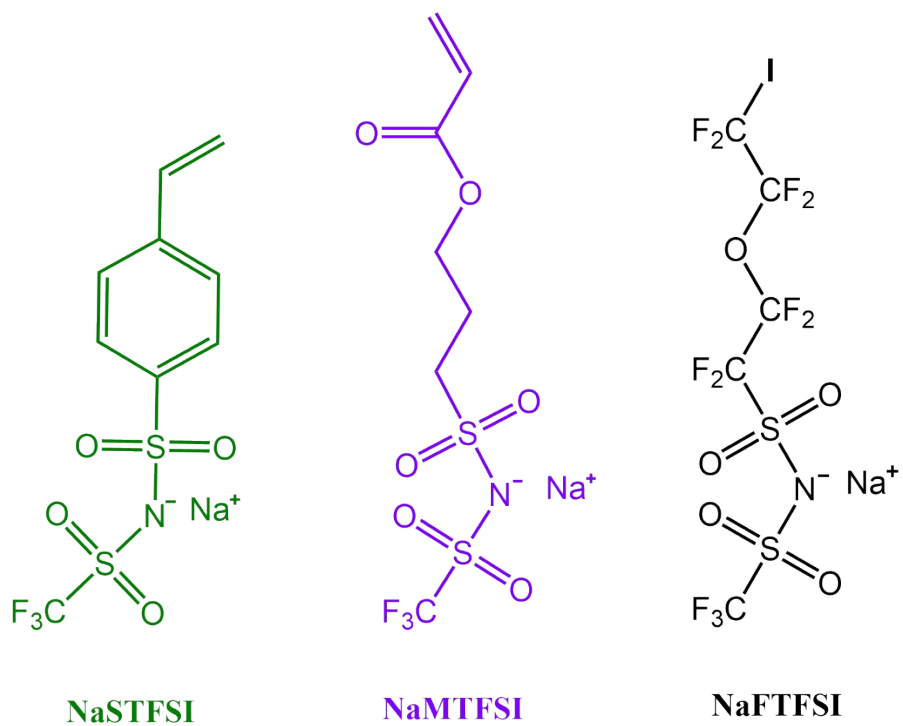


Figure S1. Structure of the three sodium salt monomers (SSMs): NaSTFSI, NaMTFSI and NaFTFSI.

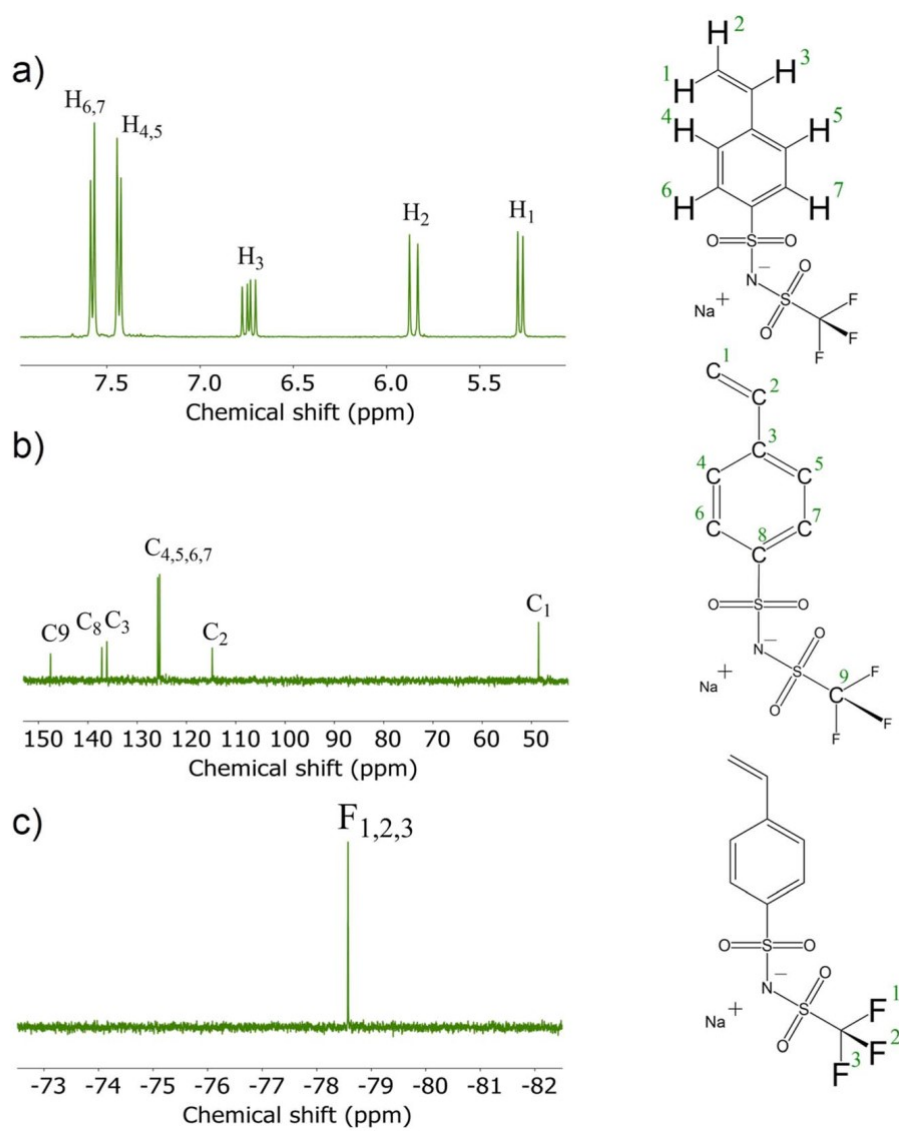


Figure S2. a) ^1H , b) ^{13}C and c) ^{19}F -NMR of NaSTFSI.

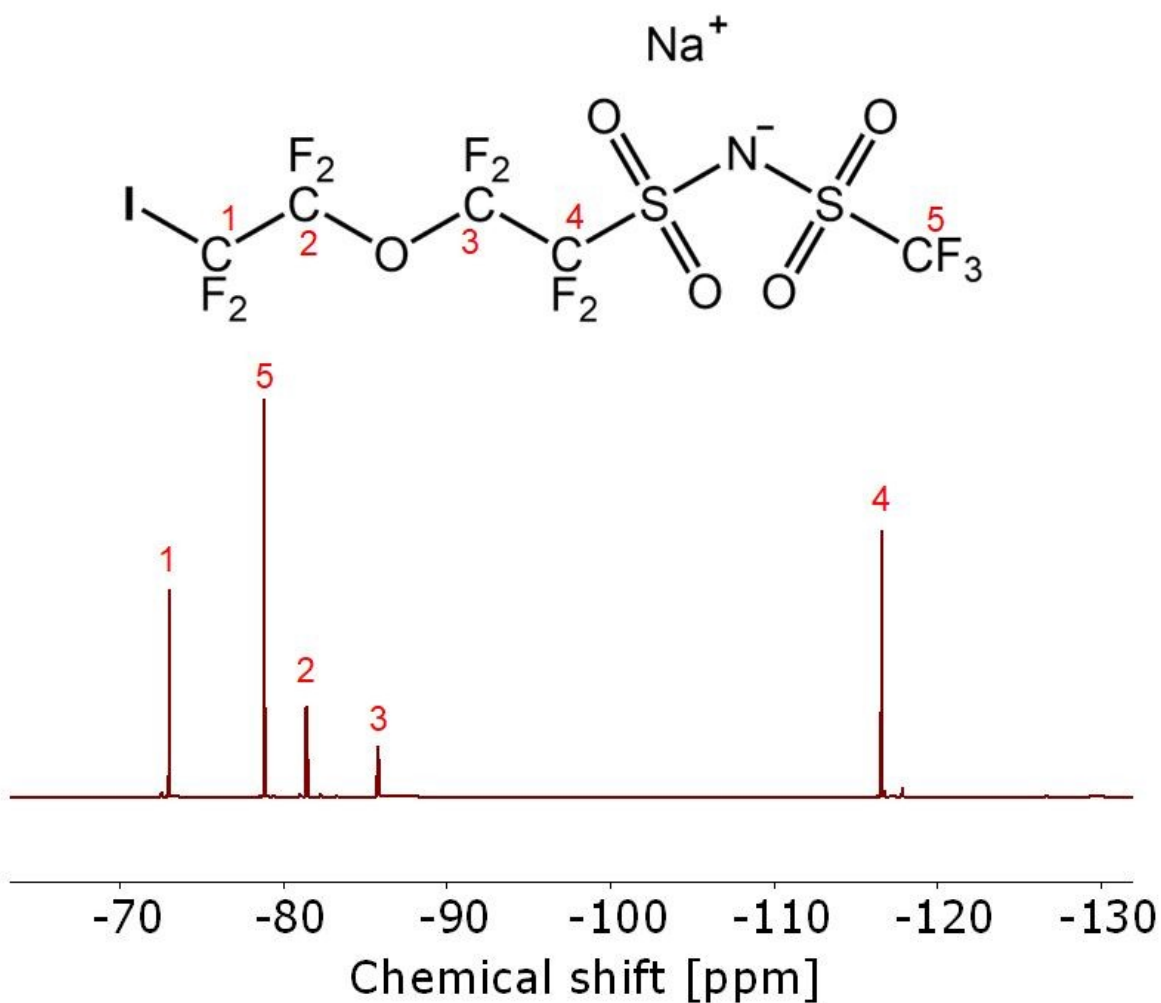


Figure S3. ^{19}F -NMR of NaFTFSI.

I-psiLi was synthesized as described in the literature.^{1,2} The structure of the NaFTFSI was confirmed by ^{19}F -NMR. The NMR shows all 5 CF peaks of NaFTFSI and no other peaks, suggesting that a pure product was obtained.

¹ H-D. Nguyen, G-T. Kim, J. Shi, E. Paillard, P. Judeinstein, S. Lyonnard and D. Bresser, *Energy Environ. Sci.* 2018, 11, 3298–3309 (2018).

² A. Mayer, A. Mariani, X. Dong, G. Vansse, P. Theato, C. Iojoiu, S. Passerini and D. Bresser, *Macromolecules* 2023, 56, 2505–2514.

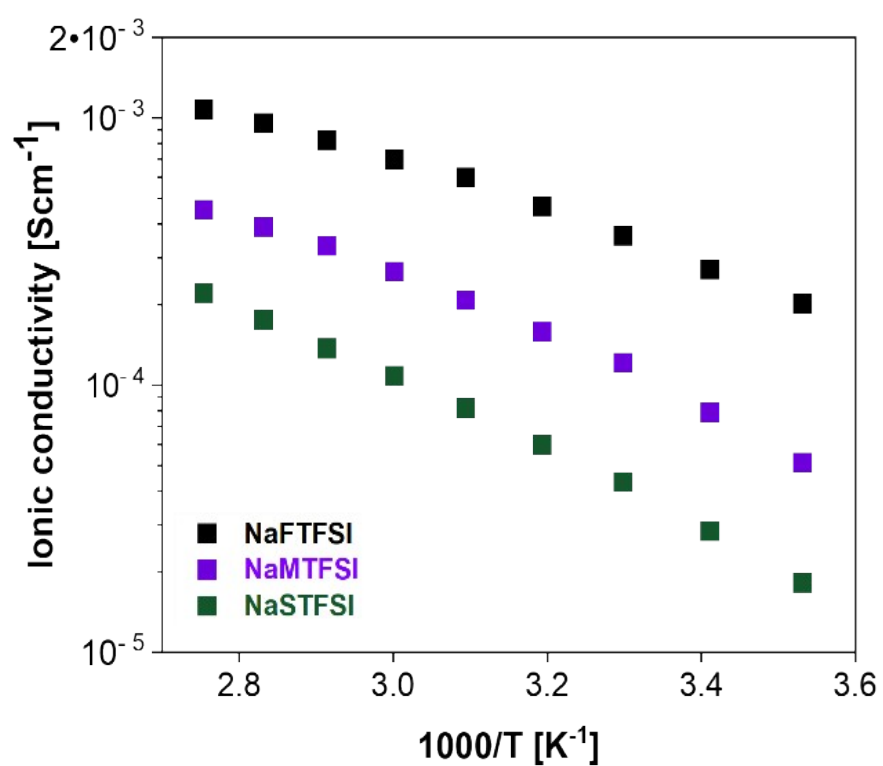


Figure S4. Arrhenius plot $\ln(\sigma)$ vs $1000/T$ of NaSTFSI-, NaMTFSI- and NaFTFSI-based SIPES containing 50 wt.% of EC:DMC:FEC.

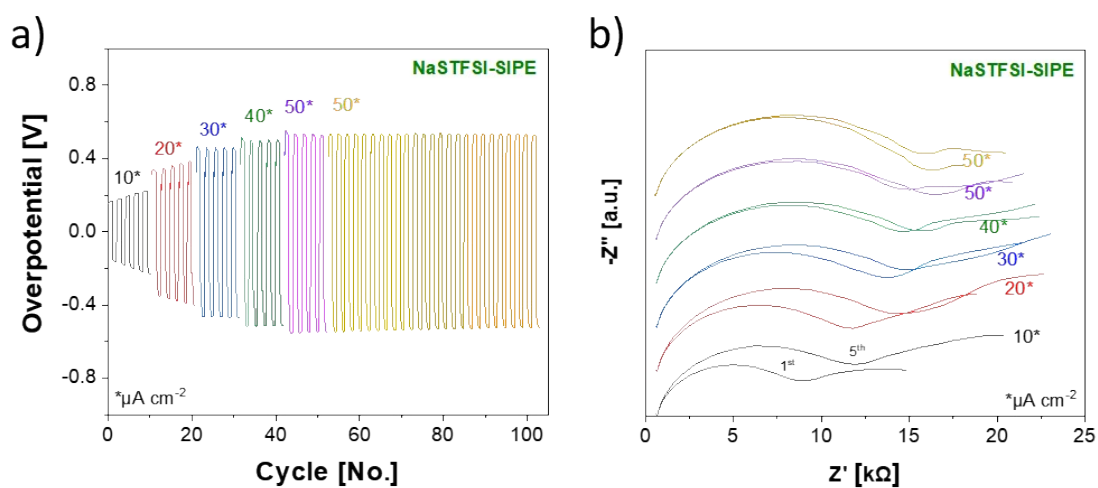


Figure S5. a) Stripping/plating behavior and b) Nyquist plot of NaSTFSI-SIPE in Na||SIPE||Na cell at 40 °C.

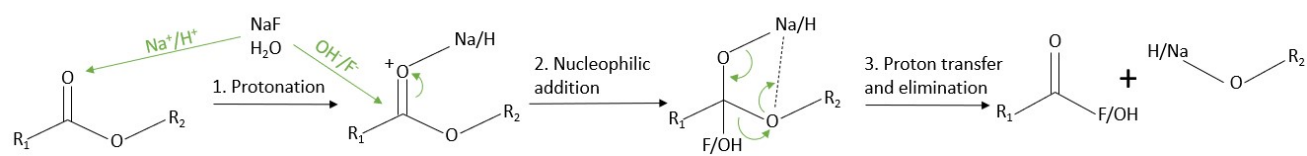


Figure S6. Possible decomposition reaction of the methacrylate ester group in the presence of NaF or H₂O.

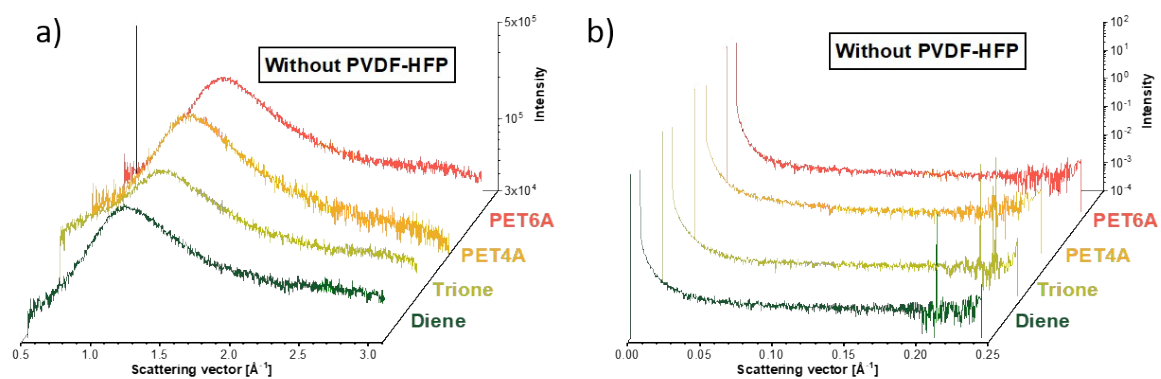


Figure S7. a) WAXS and b) SAXS patterns of the diene-, trione-, PET4A- and PET6A-SIPE without PVDF-HFP.

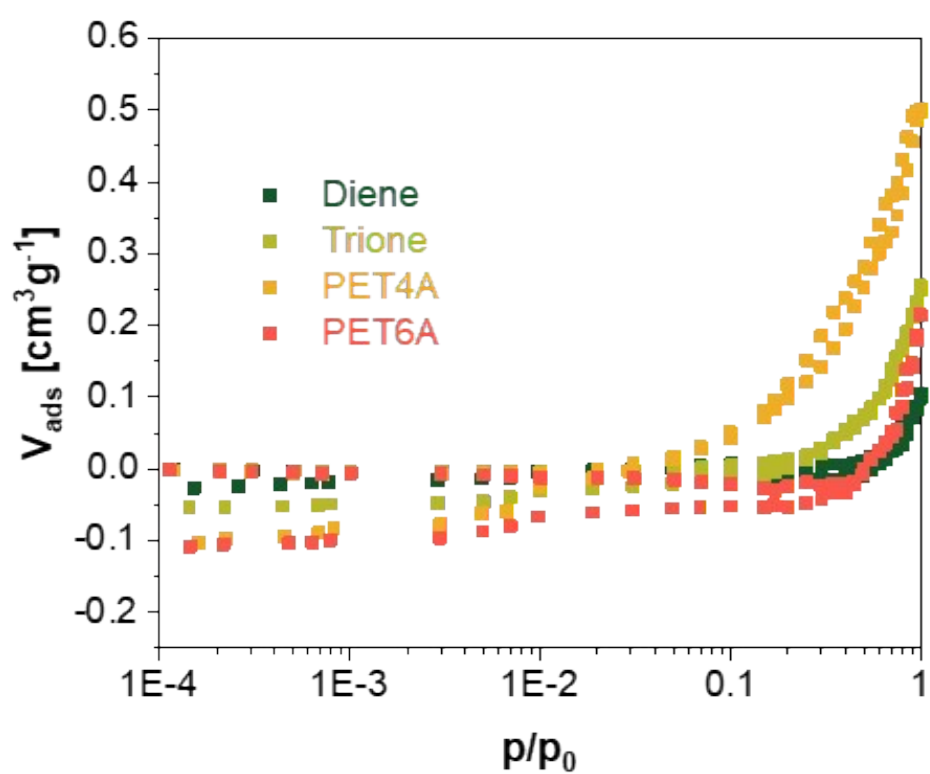


Figure S8. The Ar isotherm of the BET measurements of the dry diene-, trione-, PET4A- and PET6A-SIPes with PVDF-HFP.

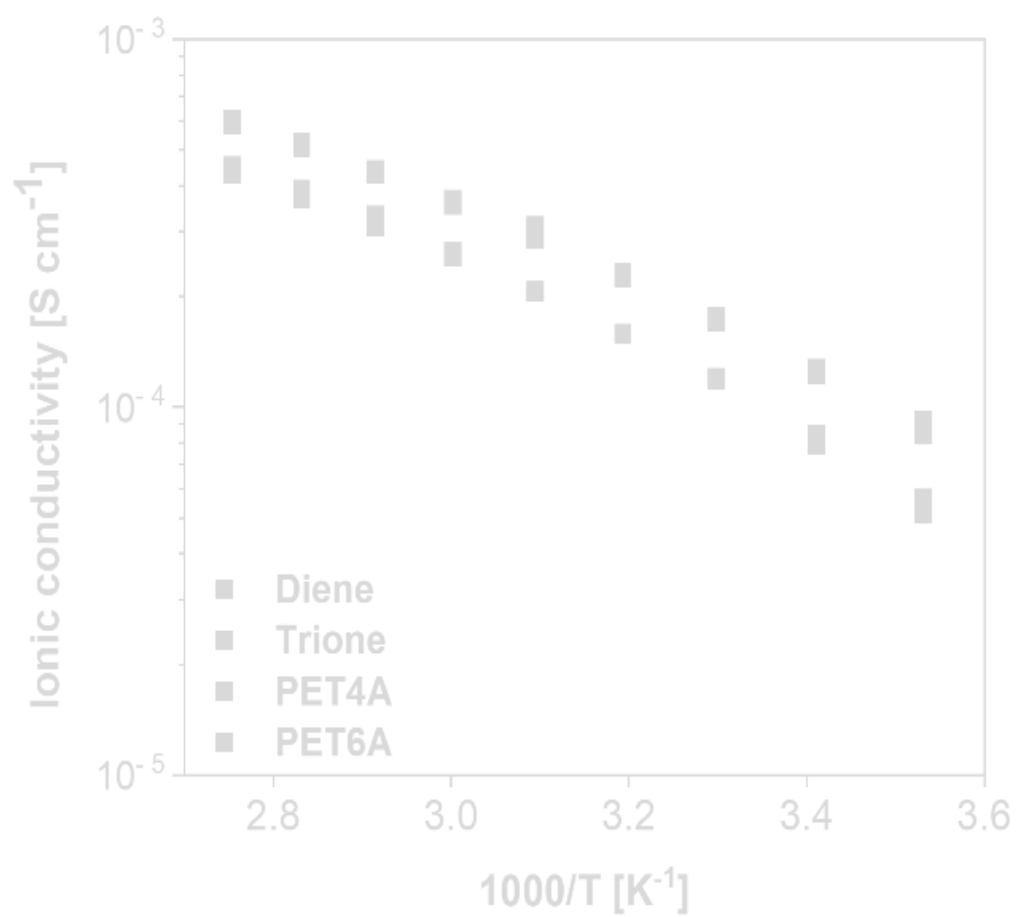


Figure S9. Arrhenius plot of diene-, trione-, PET4A- and PET6A-SIPE containing 50 wt.% of molecular transporters (EC:DMC:FEC).