

Enhancing the performance of ceramic rich polymer composite electrolytes using polymer grafted LLZO

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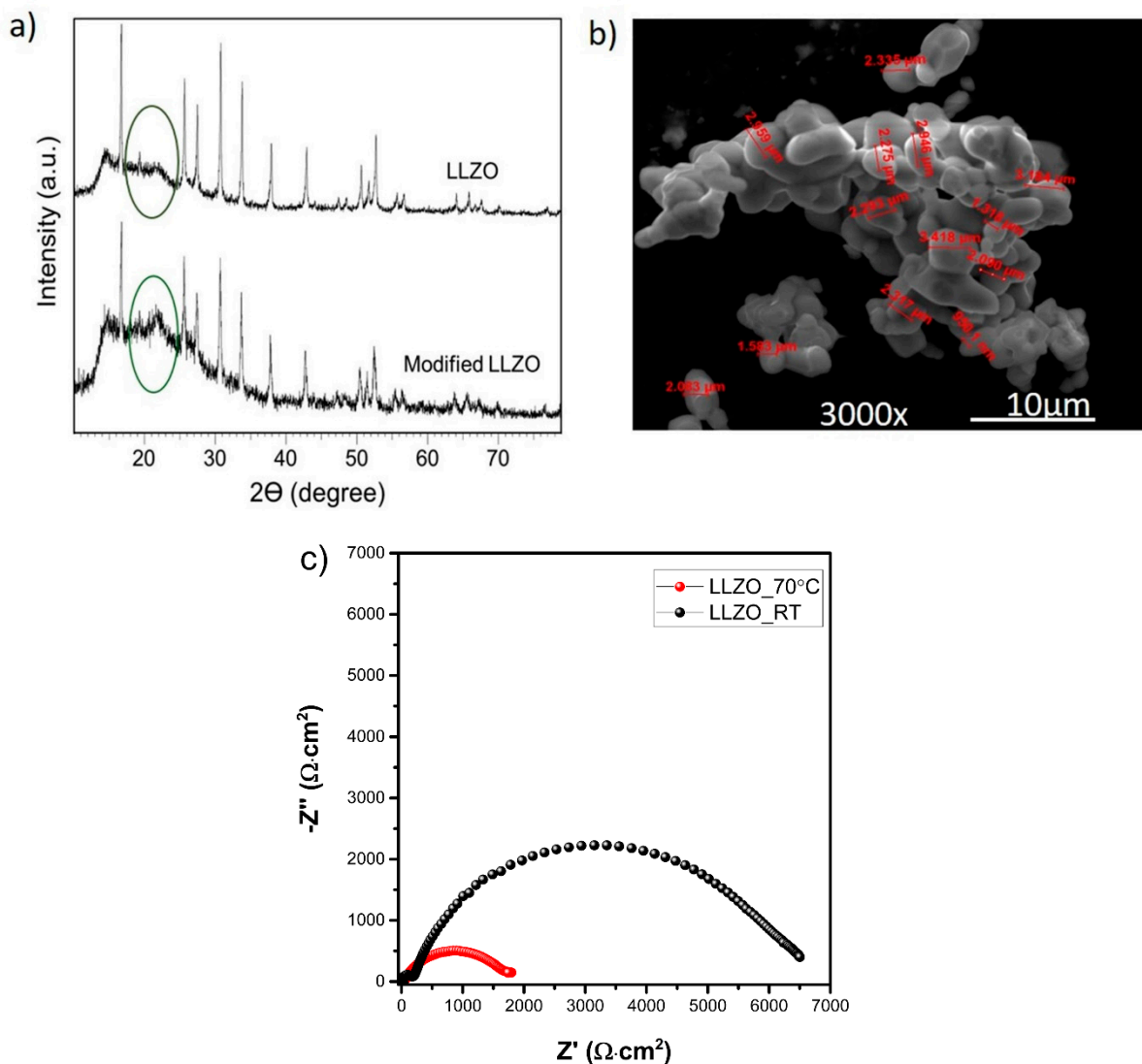


Figure S1 a) Powder X-ray diffraction patterns of the pure cubic Ga-substituted LLZO ($\text{Li}_{6.55}\text{Ga}_{0.15}\text{La}_3\text{Zr}_2\text{O}_{12}$) powder without (top) and with (bottom) grafted PEG showing the presence of PEG (green circles) in the grafted LLZO; b) SEM image of the LLZO particles and c) Nyquist plot of LLZO pellet taken at RT and 70 °C with Li electrodes.

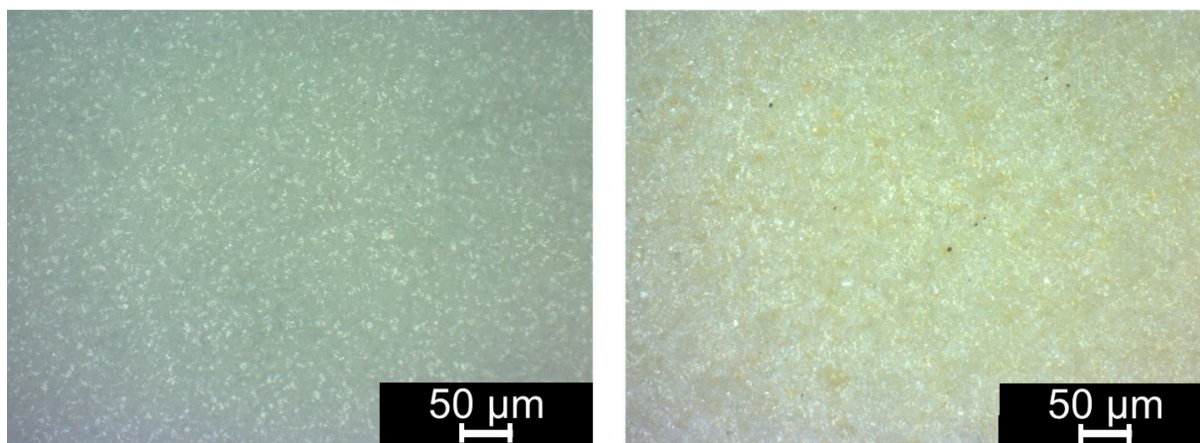


Figure S2 Optical microscope images of PEO:LiTFSI + 30 vol% LLZO membranes without (left) and with (right) LLZO modification.

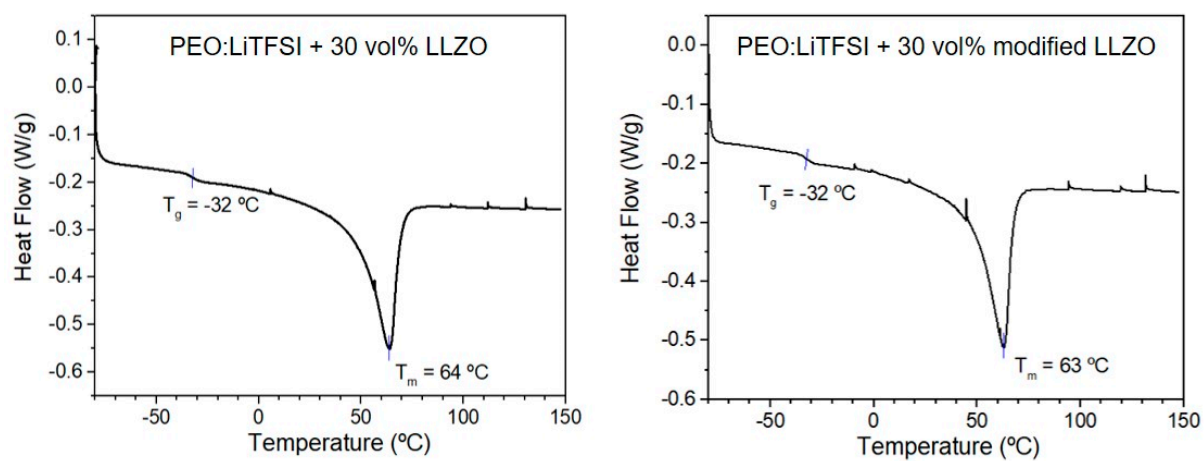


Figure S3 Differential scanning calorimetry curves of PEO:LiTFSI + 30 vol% LLZO (left) and PEO:LiTFSI + 30 vol% modified LLZO (right).

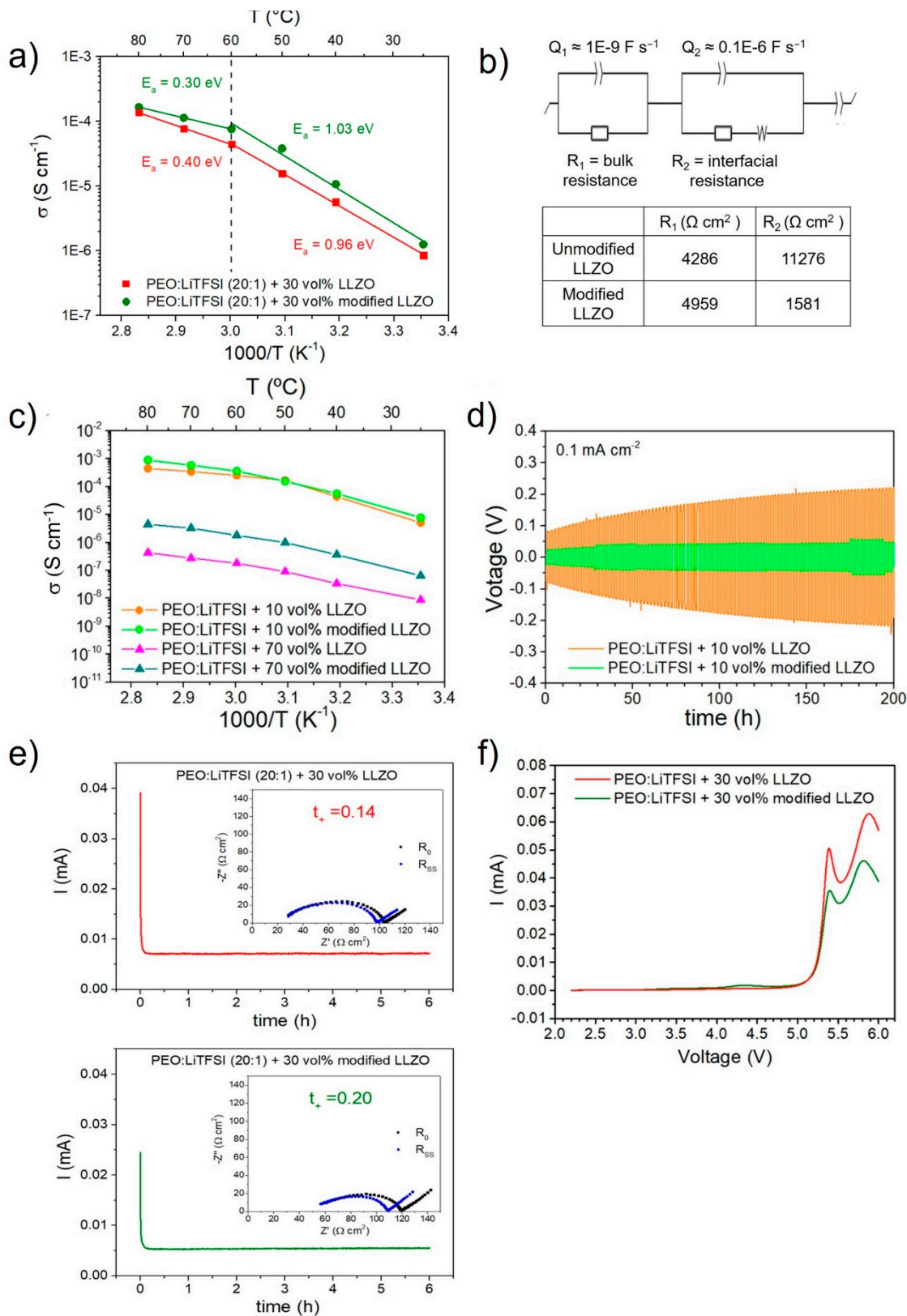


Figure S4 a) Arrhenius plots of PEO:LiTFSI + 30 vol% LLZO composite membranes with the corresponding activation energies above and below PEO:LiTFSI (20:1) melting point (60°C);

b) equivalent circuit and resistances calculated by fitting for Nyquist plots at 25 °C of PEO:LiTFSI +30 vol% unmodified and modified LLZO electrolytes; c) Arrhenius plots of 10 and 70 vol% LLZO composite membranes; d) Plating/stripping measurements of 10 vol% LLZO composite membranes at 70 °C; e) Li-ion transference number (t_{Li^+}) measurements of PEO:LiTFSI + 30 vol% LLZO (up) and PEO:LiTFSI + 30 vol% modified LLZO (down) at 70 °C; f) Linear sweep voltammetry curves of PEO:LiTFSI + 30 vol% LLZO composite membranes at 70 °C.