Supporting Information

Remarkably boosted High-temperature Energy Storage of Polymer Dielectrics induced by Polymethyksesquioxane Microspheres

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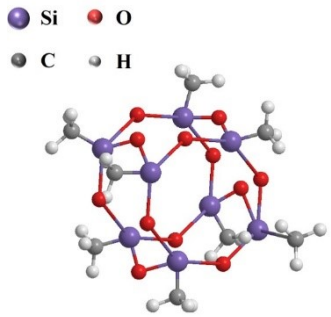

Figure S1. The Chemical structure of the polymethyksesquioxane (PMSQ)

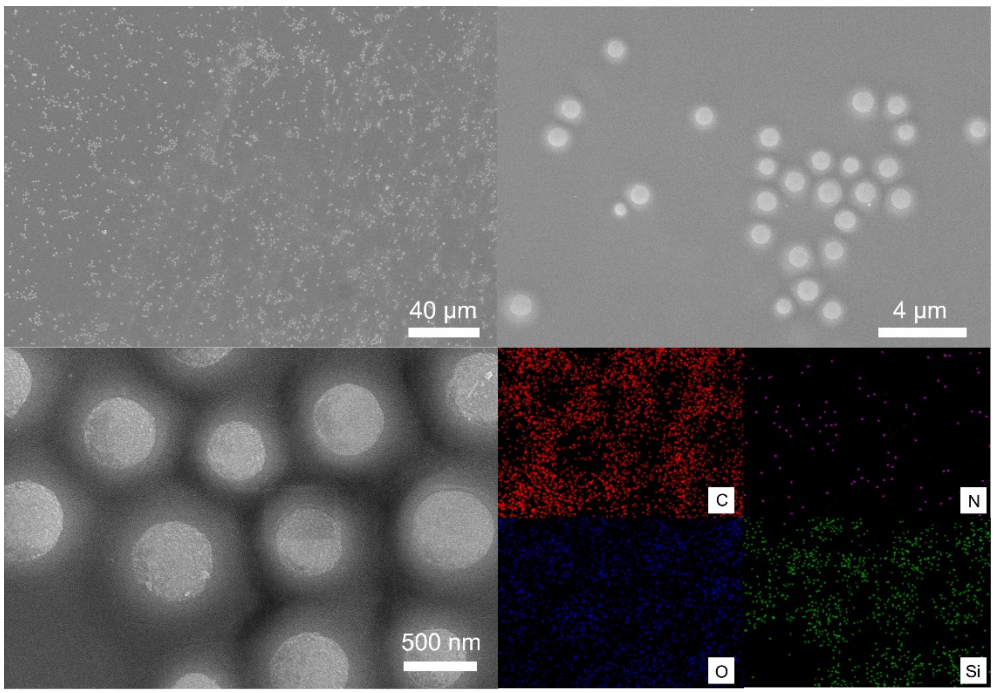

Figure S2. The SEM and EDS mappings of the surafce of 10 wt.% PMSQ/PEI film

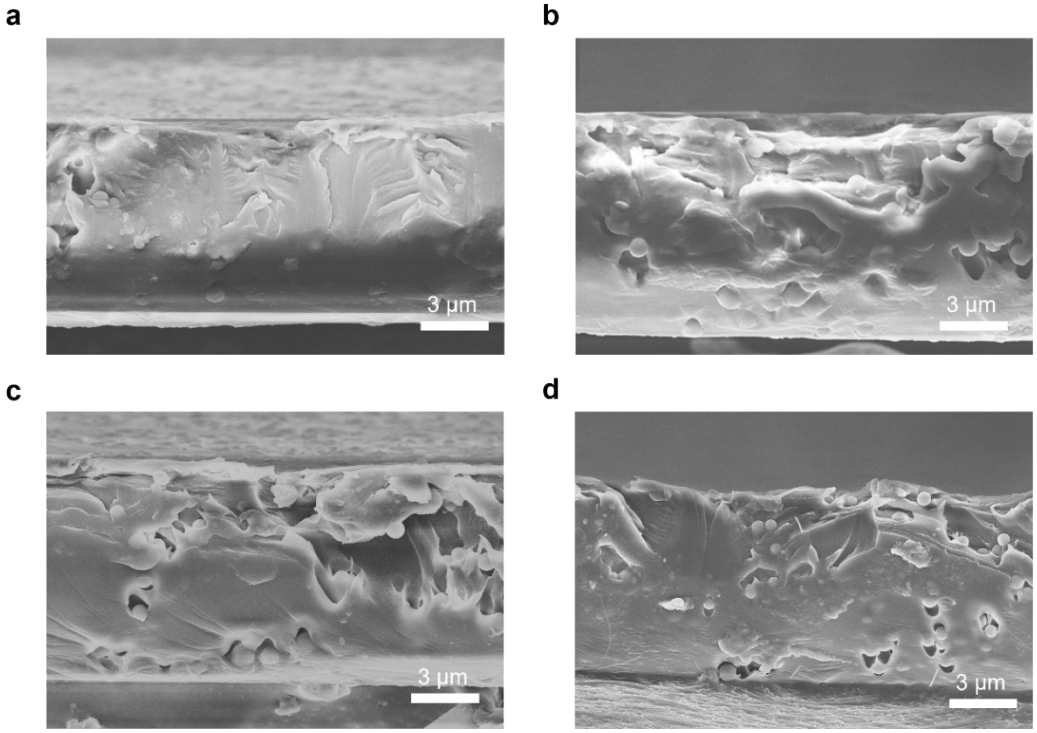

Figure S3. Cross-sectional SEM images of a) 2.5 wt.% PMSQ/PEI; b) 5 wt.% PMSQ/PEI; c) 7.5 wt.% PMSQ/PEI; d) 10 wt.% PMSQ/PEI composite films.

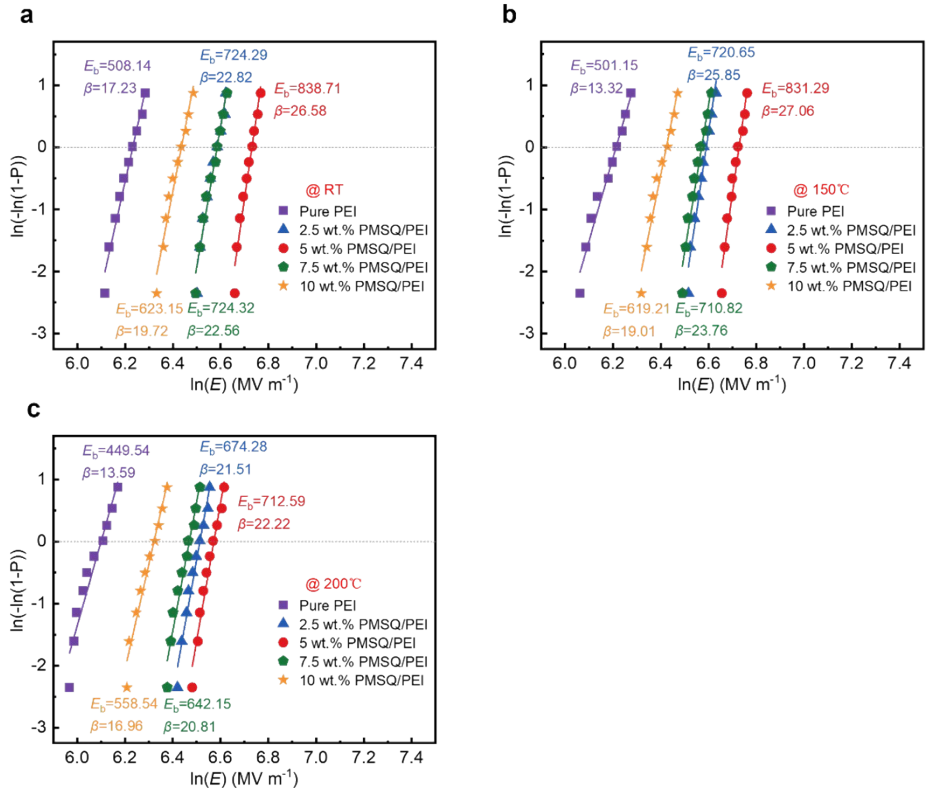

Figure S4. Two-parameter Weibull distribution analysis of the characteristic breakdown strength of pure PEI films and PMSQ/PEI composite films measured at a) room temperature; b) 150 ℃ and c) 200 ℃.

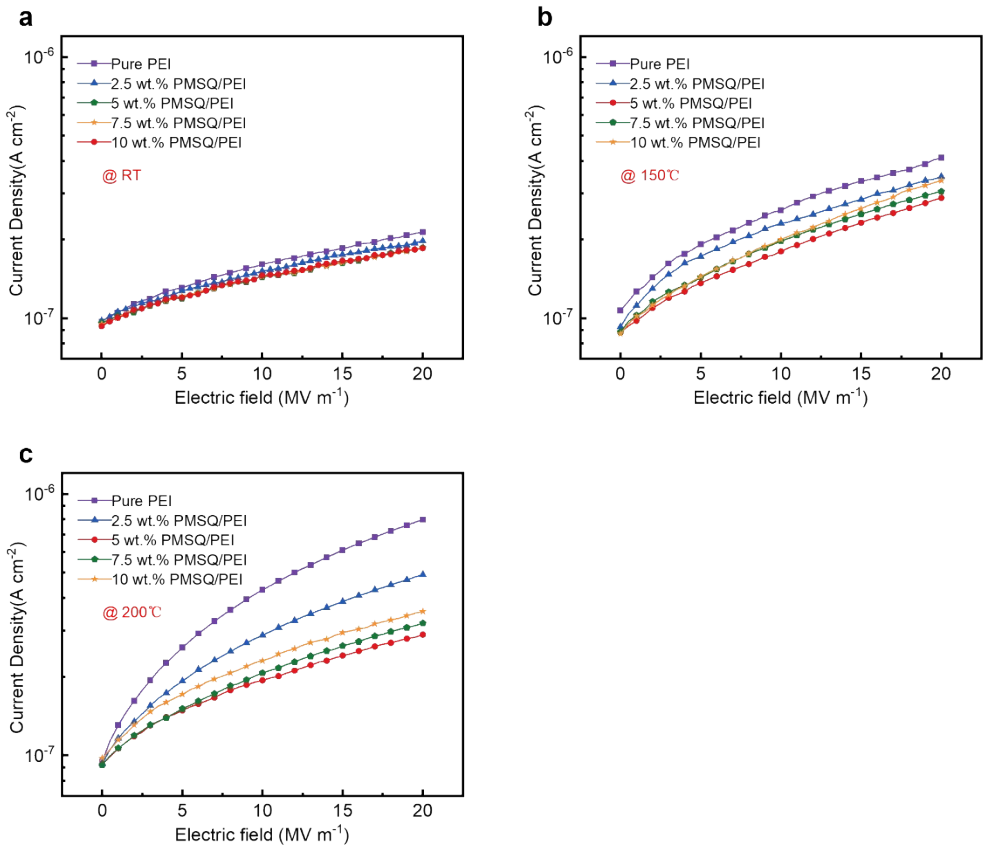

Figure S5. The leakage current of the pure PEI films and PMSQ/PEI composite films measured at a) room temperature; b) 150 ℃ and c) 200 ℃.

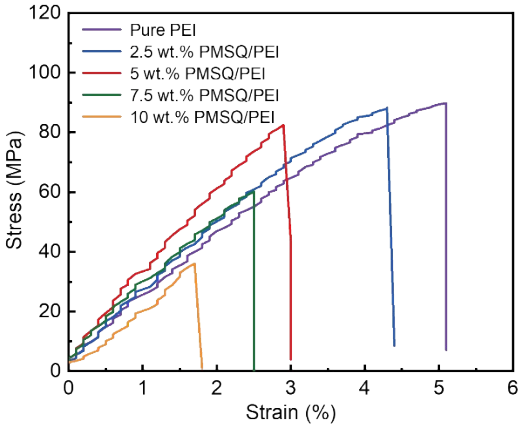

Figure S6. Representitive stress-strain curves of the pure PEI films and PMSQ/PEI composite films.

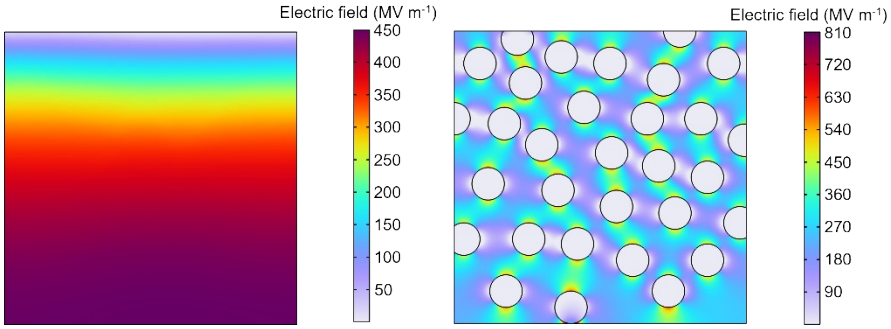

Figure S7. COMSOL simulation of electric fieled inside the pure PEI and PMSQ/PEI composite films.

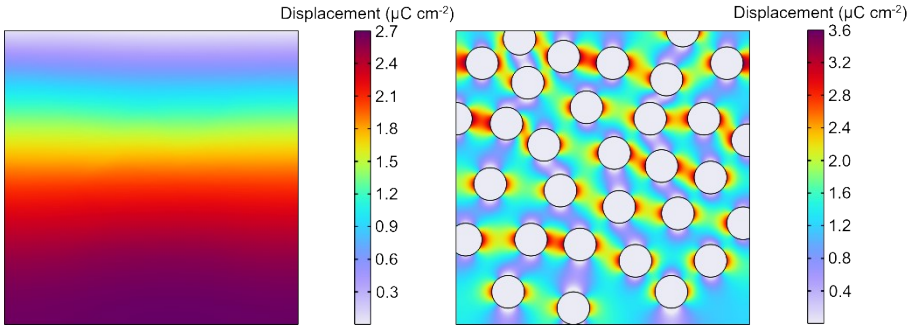

Figure S8. COMSOL simulation of polarization distributions inside the pure PEI and PMSQ/PEI composite films.

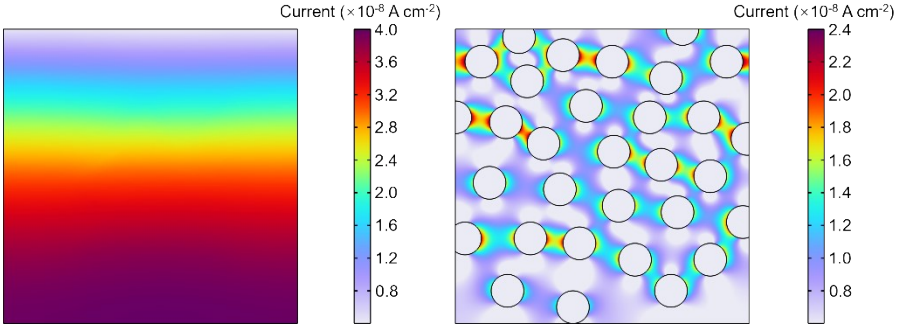

Figure S9. COMSOL simulation of leakage current of the pure PEI and PMSQ/PEI composite films.

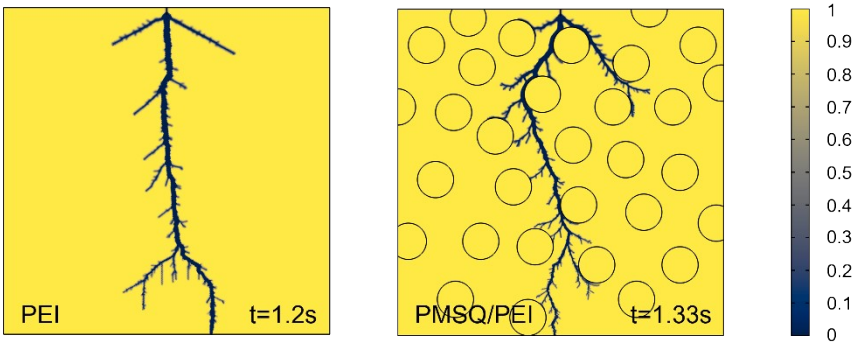

Figure S10. The whole simulated electrical tree propagation path of PEI and composite film.

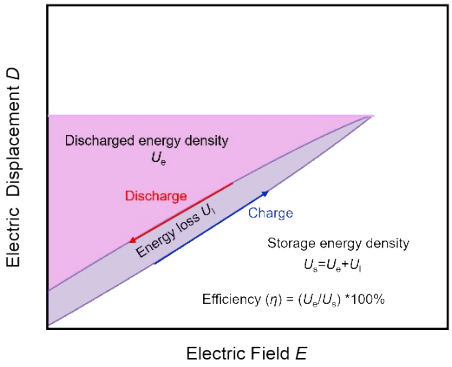

Figure S11. Schematic unipolar *D-E* loop of a dielectric material.

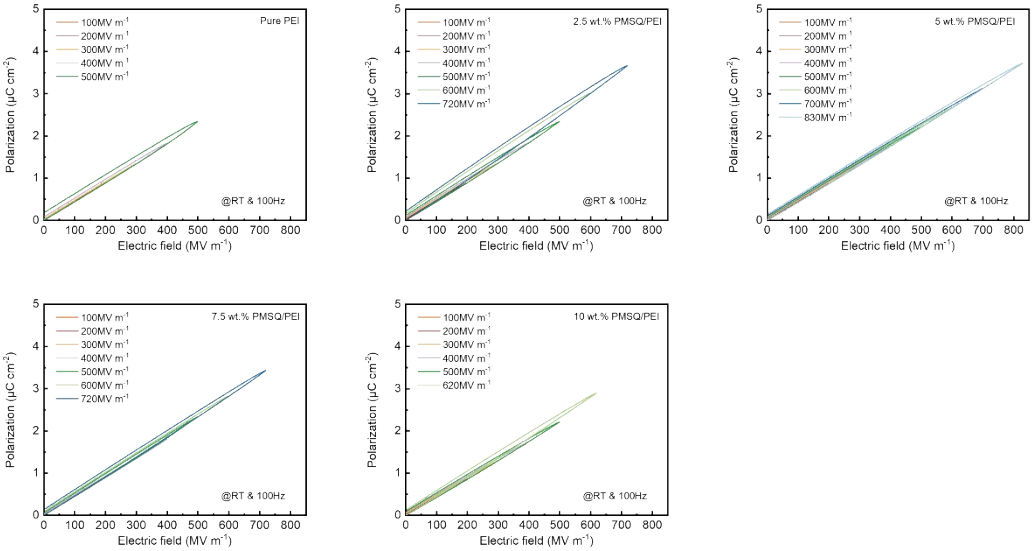

Figure S12. *D-E* loops of pure PEI film and PMSQ/PEI composite films at room temperature and 100 Hz.

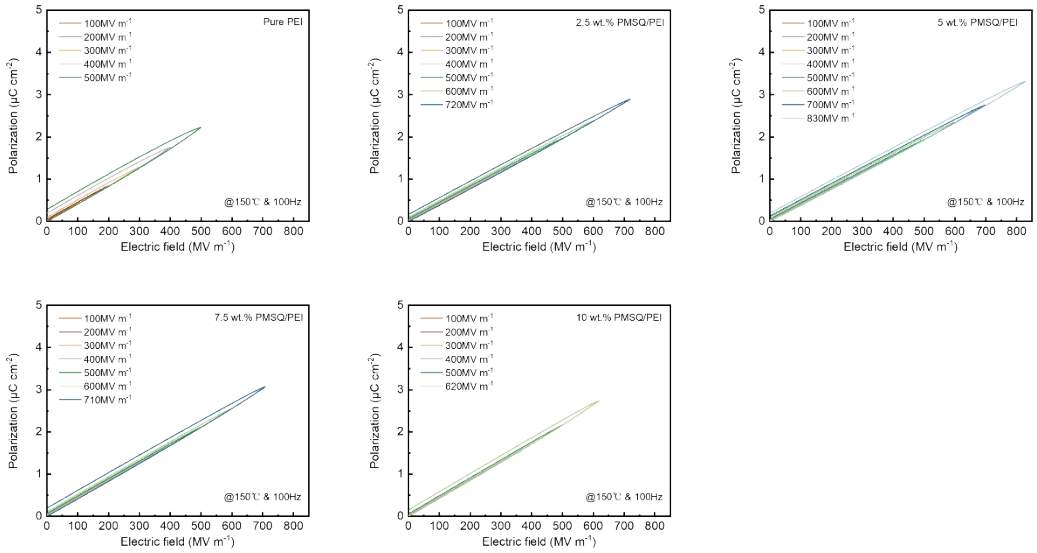

Figure S13. *D-E* loops of pure PEI film and PMSQ/PEI composite films at 150 ℃ and 100Hz.

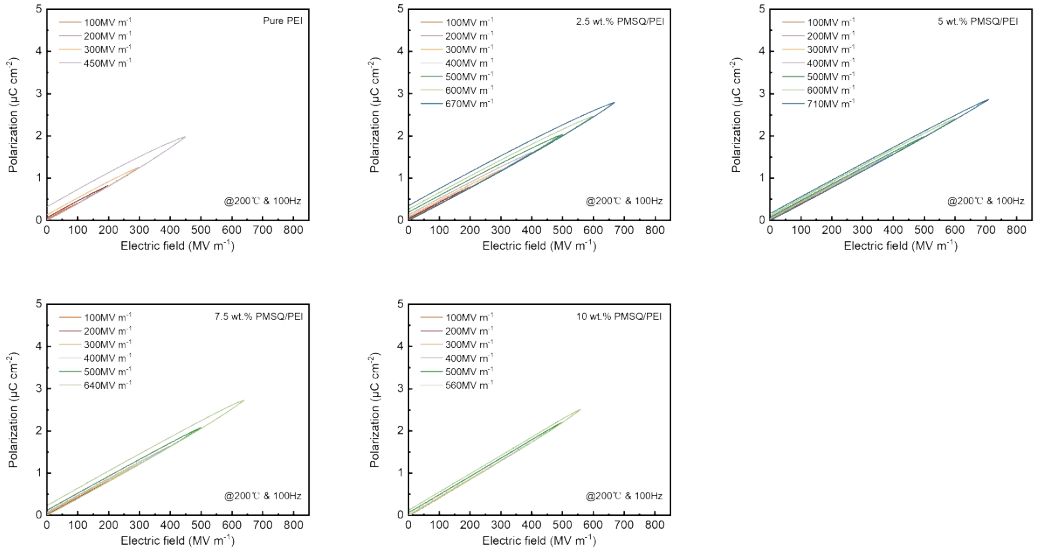

Figure S14. *D-E* loops of pure PEI film and PMSQ/PEI composite films at 200 ℃ and 100Hz.

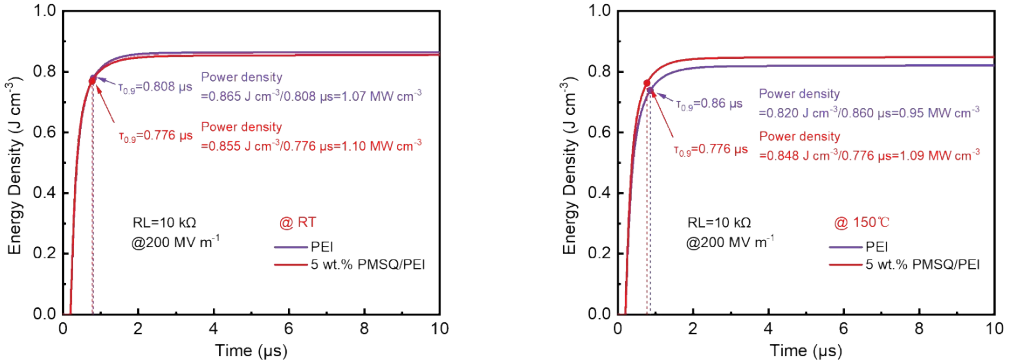

Figure S15. Fast discharge testing of pure PEI film and 5 wt.% PMSQ/PEI composite film at 200 MV m^{-1} and different temperatures.

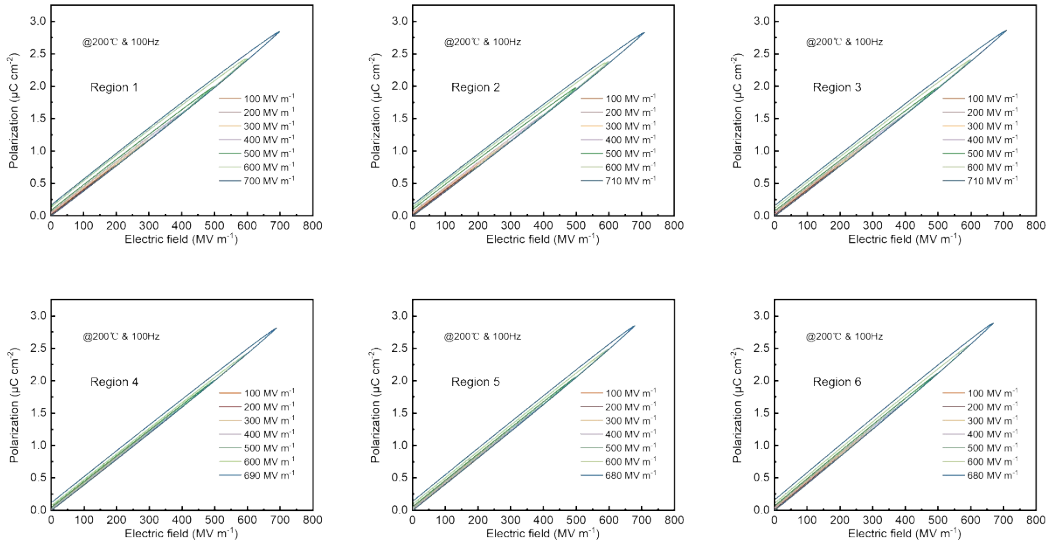

Figure S16. *D-E* loops of different region under variation electric field at 200 ℃ and 100Hz.

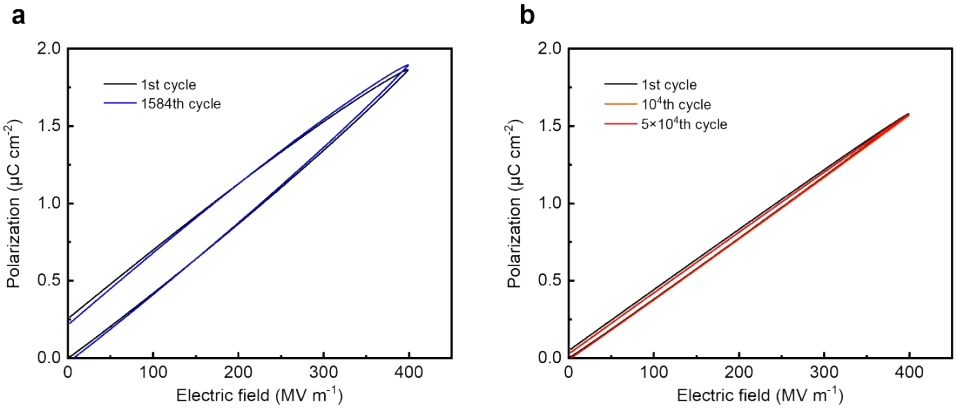

Figure S17. *D-E* loops (under 400MV m^{-1} and 200°C) of the (a) pure PEI and (b) 5 wt.% PMSQ/PEI films measured at different cycles

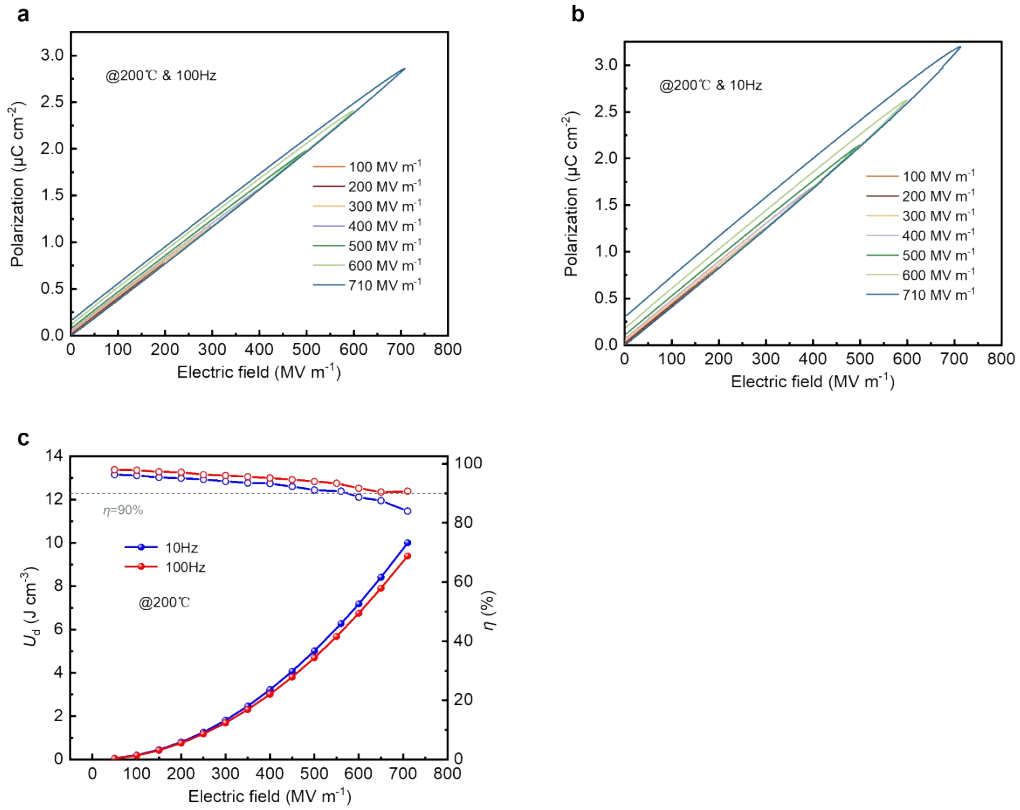

Figure S18. The *D-E* loops of 5 wt.% PMSQ/PEI composite film at 200°C and a) 100Hz b) 10Hz; c) The discharged energy densities and efficiency of 5 wt.% PMSQ/PEI composite film at 200°C and different frequency.