Supplementary Material

Laminated ferroelectric polymer composites exhibiting synchronous ultrahigh
discharge efficiency and energy density via utilizing multiple-interface barriers

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Fig. S1. Schematic illustration of tri-layered structure composite film.

Fig. S2. Optical images of a) P(VDF-HFP)-S, b) 50 wt% PMMA-S and c) PMMA-S, respectively.

Fig. S3. SAED pattern of the prepared SrTiO$_3$@PDA plates.

Fig. S4. TEM image of the prepared SrTiO$_3$@PDA plates.
Fig. S5. Cross-section SEM image with a large scale of P(VDF-HFP)-S film, scale bar 40 μm.

Fig. S6. a) Cross-section SEM image, (b) magnified SEM image of 50 wt.% PMMA-S film.

Fig. S7. a) Cross-section SEM image, (b) magnified SEM image of PMMA-S film.
Fig. S8. a) dielectric constant at 1 kHz, b) dielectric loss at 1 MHz of the tri-layered configuration composites, single-layered configuration composite and pristine constituent polymers.

Fig. S9. Leakage current density a) measured at 25 MV m\(^{-1}\) and b) measured at 50 MV m\(^{-1}\) of tri-layered configuration composites, single-layered configuration composite, and pristine P(VDF-HFP).
Fig. S10. DC electrical resistivity a) measured at 25 MV m\(^{-1}\), b) measured at 50 MV m\(^{-1}\), and c) measured at 75 MV m\(^{-1}\) of tri-layered configuration composites, single-layered configuration composite, and pristine P(VDF-HFP).
Fig. S11. Unipolar electric displacement–electric fields ($D–E$) loops at varied electric fields of a) pristine P(VDF-HFP), b) single layer composite with 2.5 vol.% ST@PDA platelets and c) PMMA.
**Fig. S12.** Maximum displacement at varied electric fields of pristine P(VDF-HFP), single layer composite with 2.5 vol.% ST@PDA platelets, and tri-layered composites.

**Fig. S13.** Remnant displacement at varied electric fields of pristine P(VDF-HFP), single layer composite with 2.5 vol.% ST@PDA platelets, and tri-layered composites.
**Fig. S14.** Electric displacement difference at varied electric fields of pristine P(VDF-HFP), single layer composite with 2.5 vol.% ST@PDA platelets, and tri-layered composites.

**Fig. S15.** Charged energy density at varied electric fields of pristine P(VDF-HFP), single layer composite with 2.5 vol.% ST@PDA platelets, and tri-layered composites.
Fig. S16. Ferroelectric loss at varied electric fields of pristine P(VDF-HFP), single layer composite with 2.5 vol% ST@PDA platelets, and tri-layered composites.

Fig. S17. Conduction loss at varied electric fields of pristine P(VDF-HFP), single layer composite with 2.5 vol% ST@PDA platelets, and tri-layered composites.
**Fig. S18.** Enhancement ratio at breakdown electric fields of single layer composite with 2.5 vol% ST@PDA platelets and tri-layered composites in comparison with pristine P(VDF-HFP).

**Fig. S19.** Optical image of 50 wt% PMMA-S after winding test (1 mouth).
Fig. S20. Unipolar electric displacement–electric fields (D–E) loops at 300 MV m$^{-1}$ of 50 wt% PMMA-S before and after wound tests.

Fig. S21. Platelets size distributions of Ba$_{0.5}$Sr$_{0.5}$TiO$_3$ platelets.
**Fig. S22.** Unipolar electric displacement–electric fields ($D$–$E$) loops at varied electric fields of 50 wt.% PMMA-S tri-layered composite with 1 vol% BST@PDA plates.

**Fig. S23.** Unipolar electric displacement–electric fields ($D$–$E$) loops at varied electric fields of PMMA-S tri-layered composite with 0.5 vol% BST@PDA plates.