

**High Energy Density and Breakdown Strength from β and γ
Phases in Poly(vinylidene fluoride-*co*-
bromotrifluoroethylene) Copolymers**

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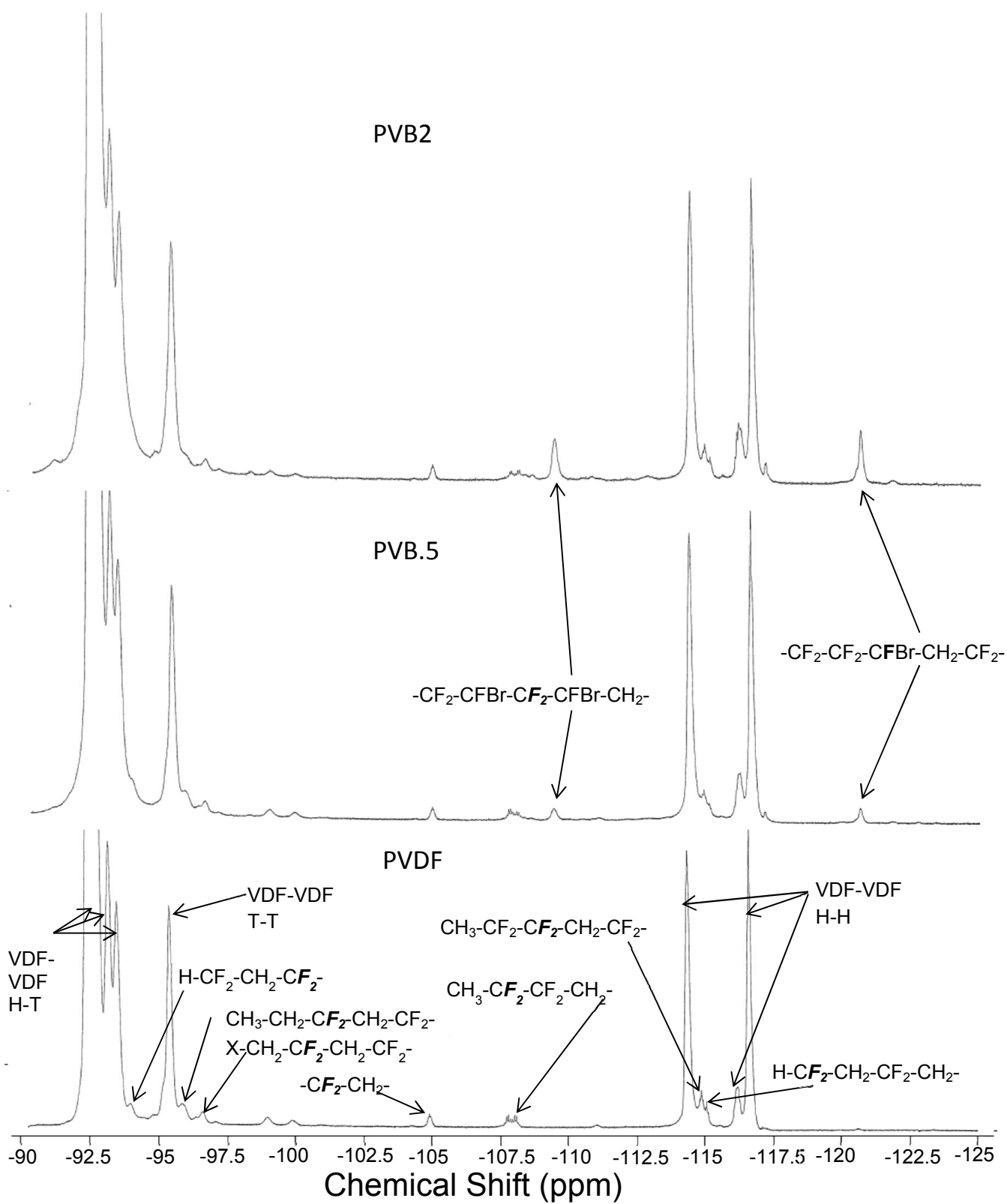


Figure S1. ^{19}F NMR of PVDF, PVB.5 and PVB2 at a reference frequency of 282 MHz in deuterated DMSO at room temperature with shifts relative to a CFCl_3 standard.

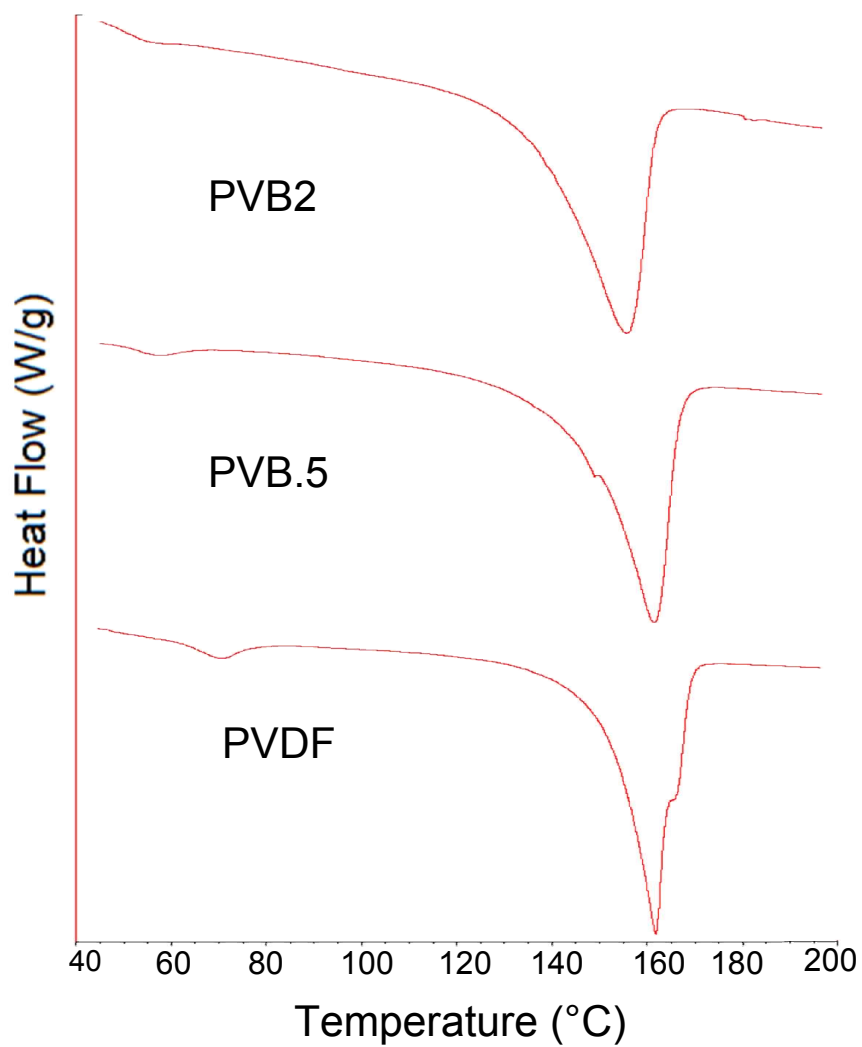


Figure S2. Melting endotherms of PVDF and BTFE copolymers. (Curves are offset for clarity)

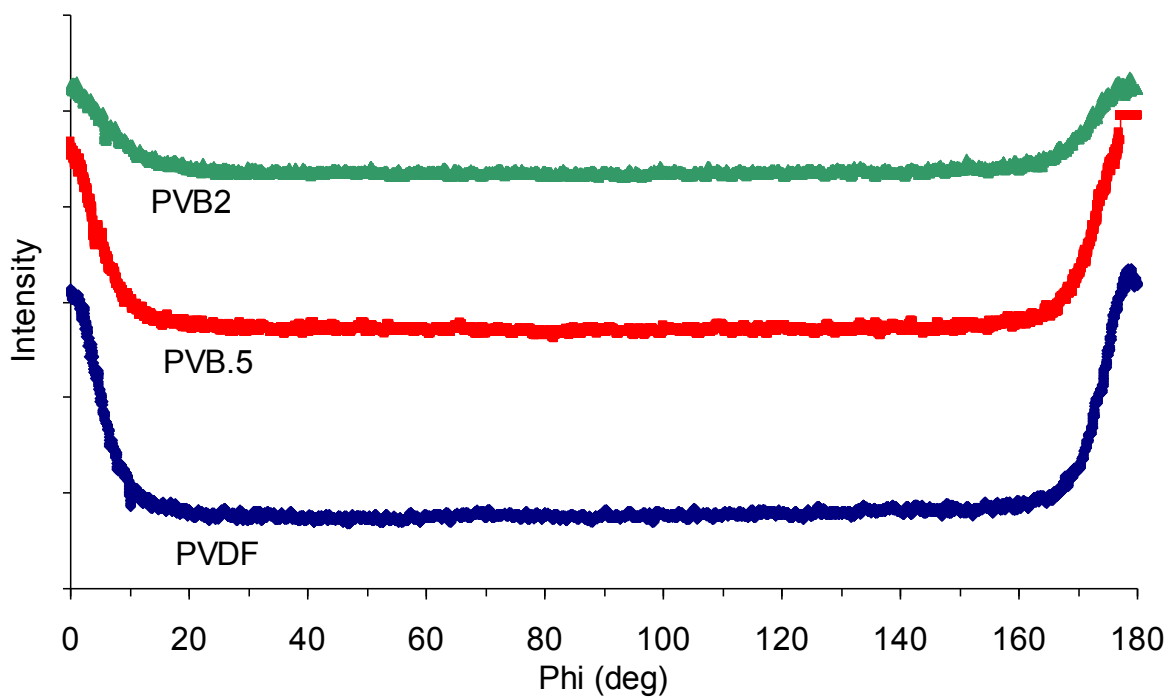


Figure S3. Intensity of (110/200) β reflection versus ϕ of PVDF, PVB.5, and PVB2. (Curves are offset for clarity)

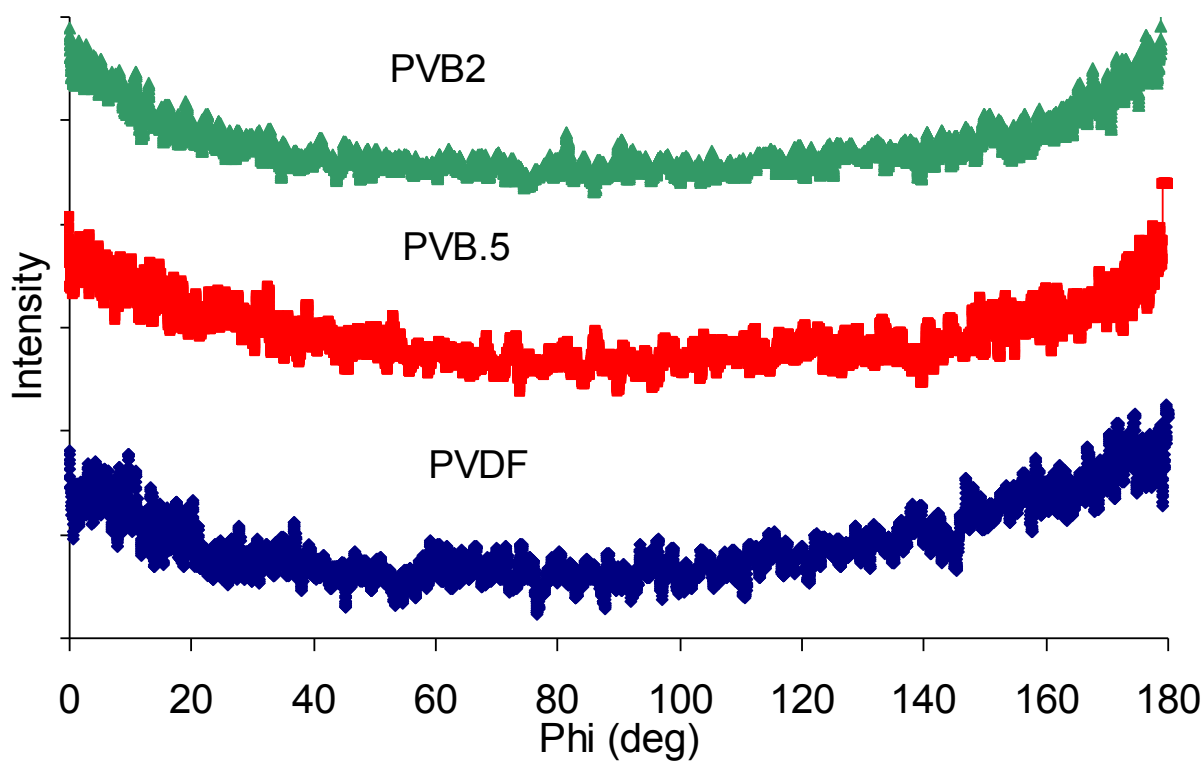


Figure S4. Intensity of (100) and (200) α reflections versus ϕ of PVDF, PVB.5, and PVB2. (Curves are offset for clarity)

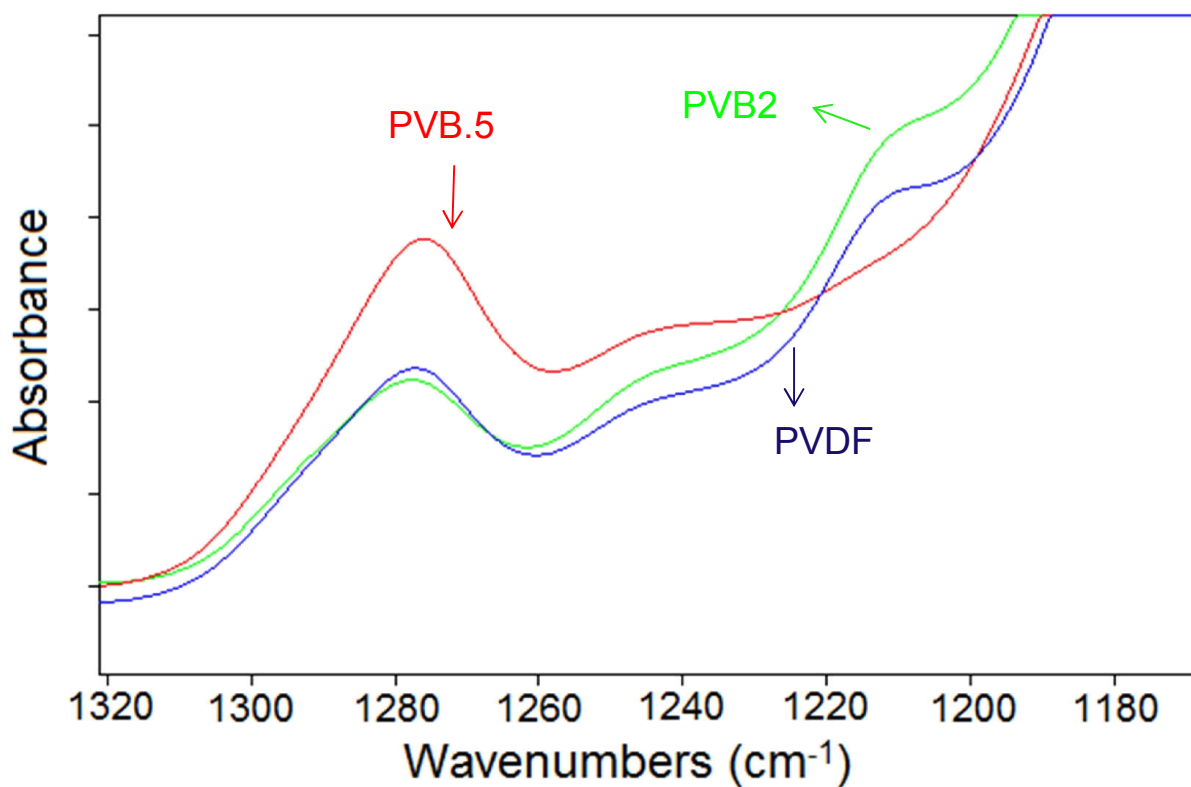


Figure S5. FTIR spectra of PVDF, PVB.5, and PVB2 samples between 1320 and 1180 cm^{-1} . The peaks located at 1275, 1235, and 1219 cm^{-1} are attributed to the β , γ , and α phases, respectively.

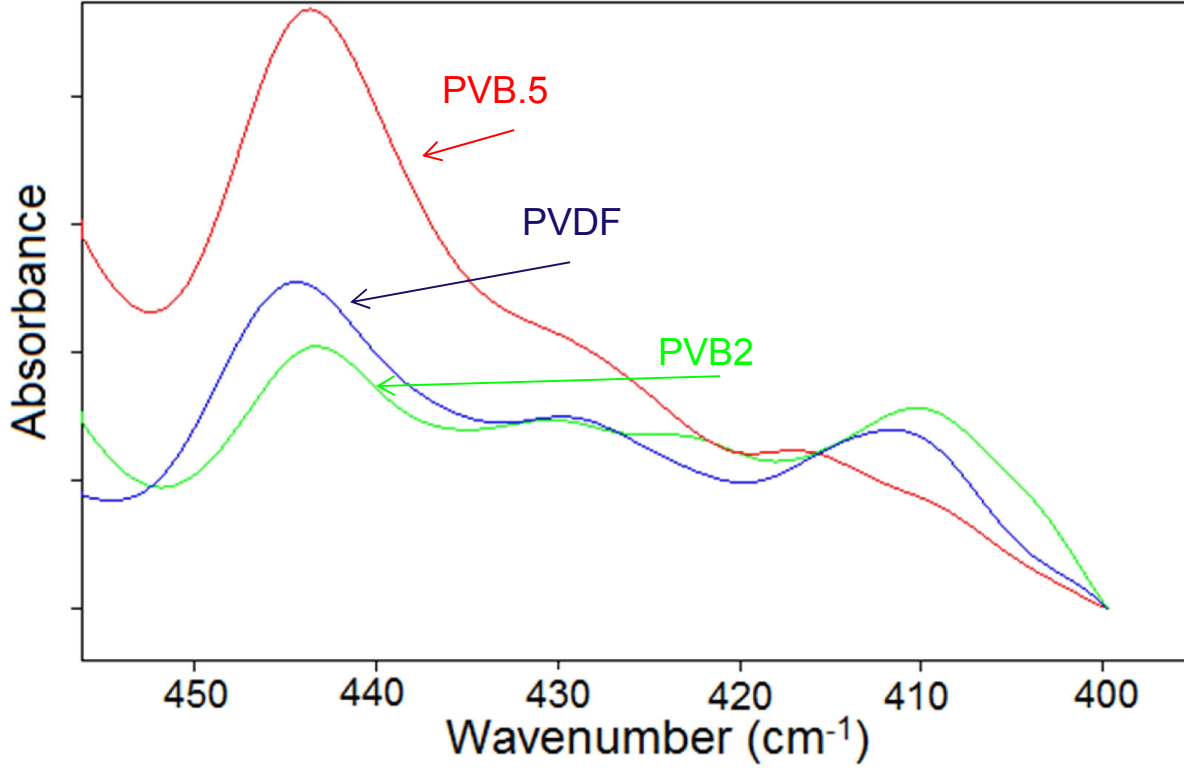


Figure S6. FTIR spectra between 460 and 400 cm^{-1} wavenumbers. Peaks located at 445, 435, and 408 are attributed to the β , γ , and α phases, respectively.

$$P_r = \sigma_{eff} \frac{E_{max}}{2} t_{max}$$

Equation S1. Relationship between remnant polarization (P_r) and effective conductivity (σ_{eff}) where E_{max} is the maximum applied field and t_{max} is the maximum time for application of field (for 10 Hz, $t_{max}=1$). The effective conductivity for each max applied field in the P/E loops were calculated to determine the conduction contribution to each loop. This equation assumes that the majority of the remnant polarization is a result of conduction which does not strictly apply to the samples considered due to significant ferroelectric loss. As such a correction is necessary which is discussed in Equation S3.

$$D = P_m - \sigma_{eff} \frac{E}{2} t = P_m - \sigma_{eff} \frac{E}{2} \frac{E}{E_{max}} \frac{t_{max}}{2} = P_m - \sigma_{eff} \frac{E^2}{4E_{max}} t_{max}$$

Equation S2. Displacement (D) of charging curve removing conduction contribution where P_m is the measured polarization and E is the applied field.

$$D = P_m - \left(P_r - \sigma_{eff} \frac{E^2}{4E_{max}} t_{max} \right)$$

Equation S3. Displacement of discharge curve removing conduction contribution with all terms as described above. Due to the ferroelectric loss when calculating the discharge curve the maximum polarization of the discharge is lower than that of the charging curve. To correct for this the difference between the charging and discharging maximum polarization is added to the P_r term of Equation S3 effectively making this difference the remnant polarization due to ferroelectric loss.

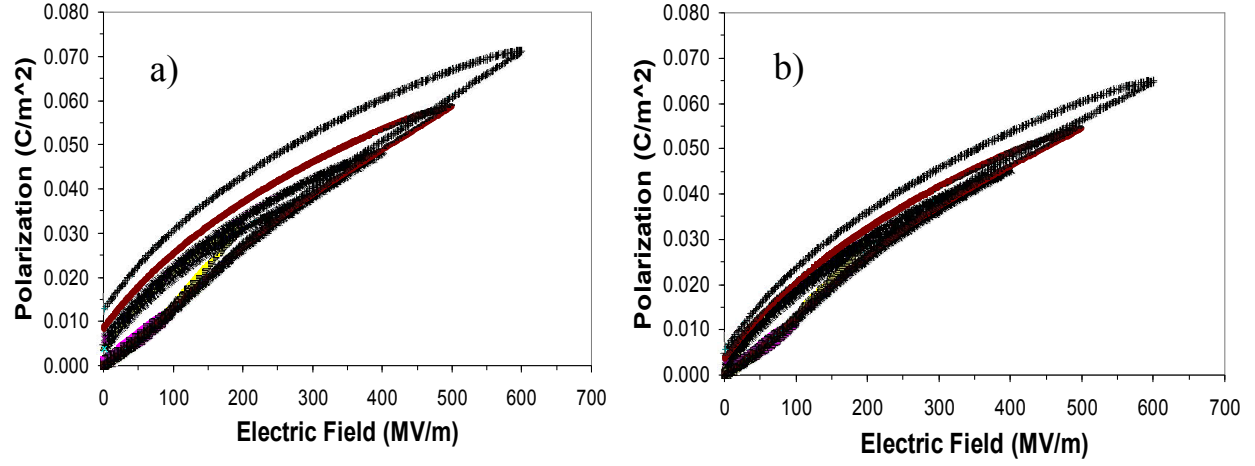


Figure S7. a) Measured polarization versus field loop of PVDF at 10 Hz and b) polarization versus field loops of PVDF at 10 Hz with conduction contribution removed.

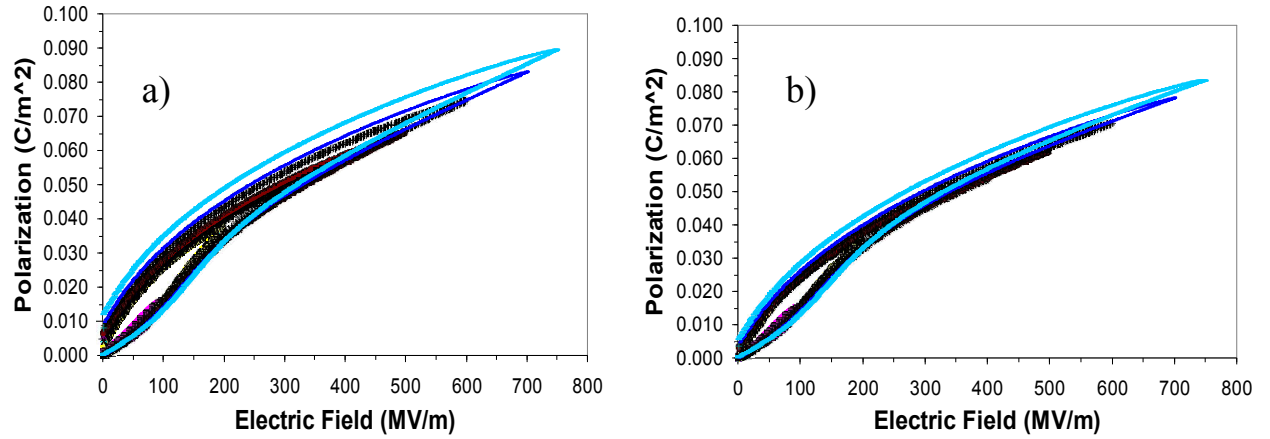


Figure S8. a) Measured polarization versus field loop of PVB.5 at 10 Hz and b) polarization versus field loops of PVB.5 at 10 Hz with conduction contribution removed.

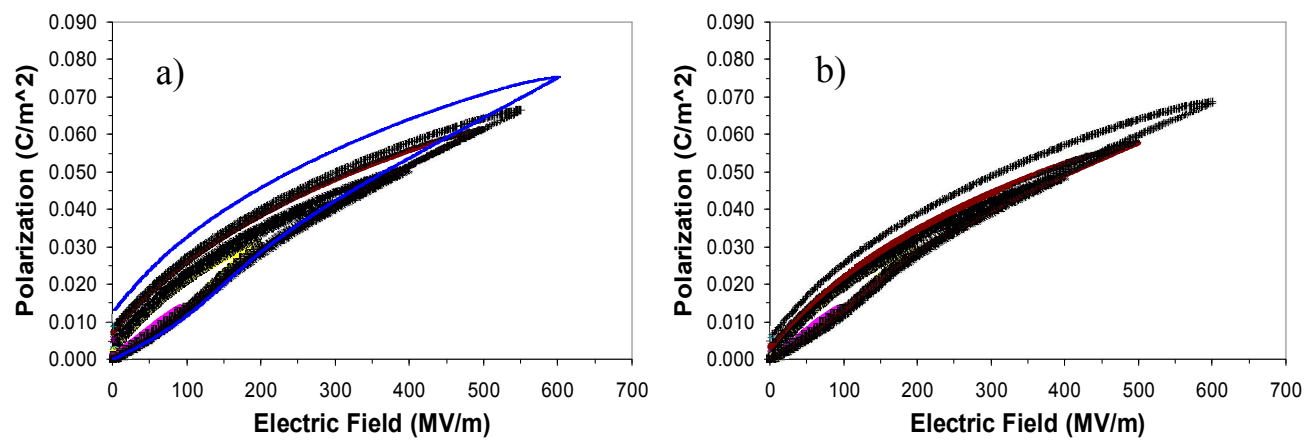


Figure S9. Measured polarization versus field loop of PVB.5 at 10 Hz and b) polarization versus field loops of PVB.5 at 10 Hz with conduction contribution removed.