Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.
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# Supplementary Information

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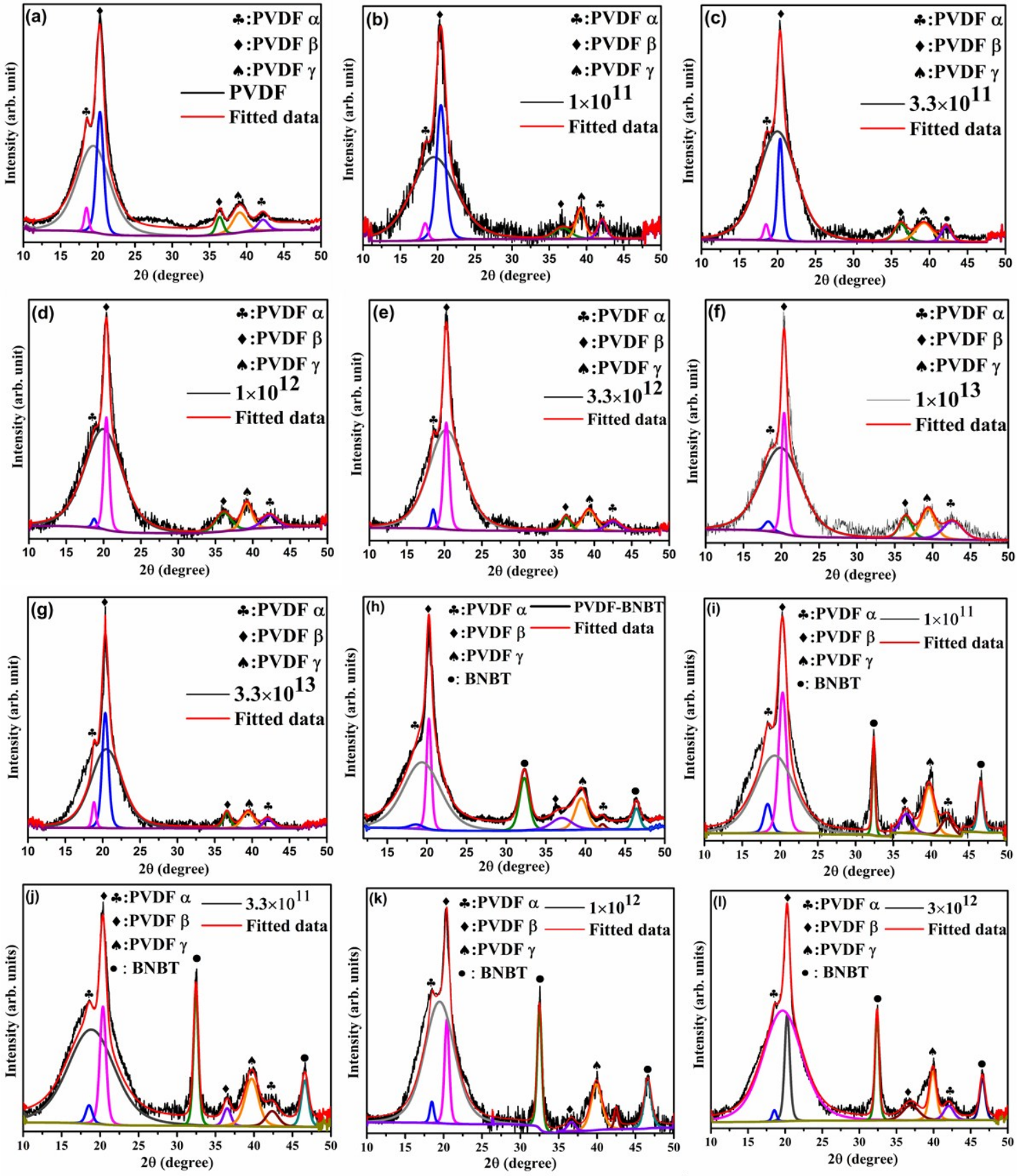
**Fig. S1** (Color online) Deconvoluted XRD spectra of PVDF (a-g) and PVDF-BNBT (h-n) for different $Li^{3+}$ ion-fluence (ions/cm$^2$) as indicated.



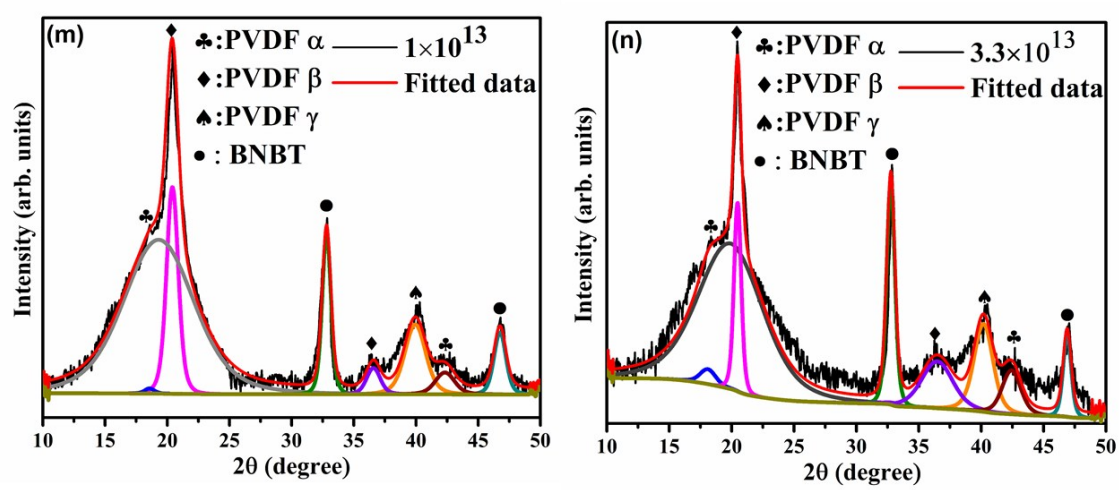

(m)
♣:PVDF α
♦:PVDF β
♠:PVDF γ
● : BNBT
1×10^13
Fitted data
Intensity (arb. units)
2θ (degree)
(n)
♣:PVDF α
♦:PVDF β
♠:PVDF γ
● : BNBT
3.3×10^13
Fitted data
Intensity (arb. units)
2θ (degree)

**Fig. S2** (Color online) Field emission scanning electron micrographs of (i) ball milled BNBT powder, (ii) Magnified micrograph of PVDF-BNBT composite, (iii-vi) $Li^{3+}$ ion-irradiated PVDF and (vii-x) PVDF-BNBT composite at indicated fluences.

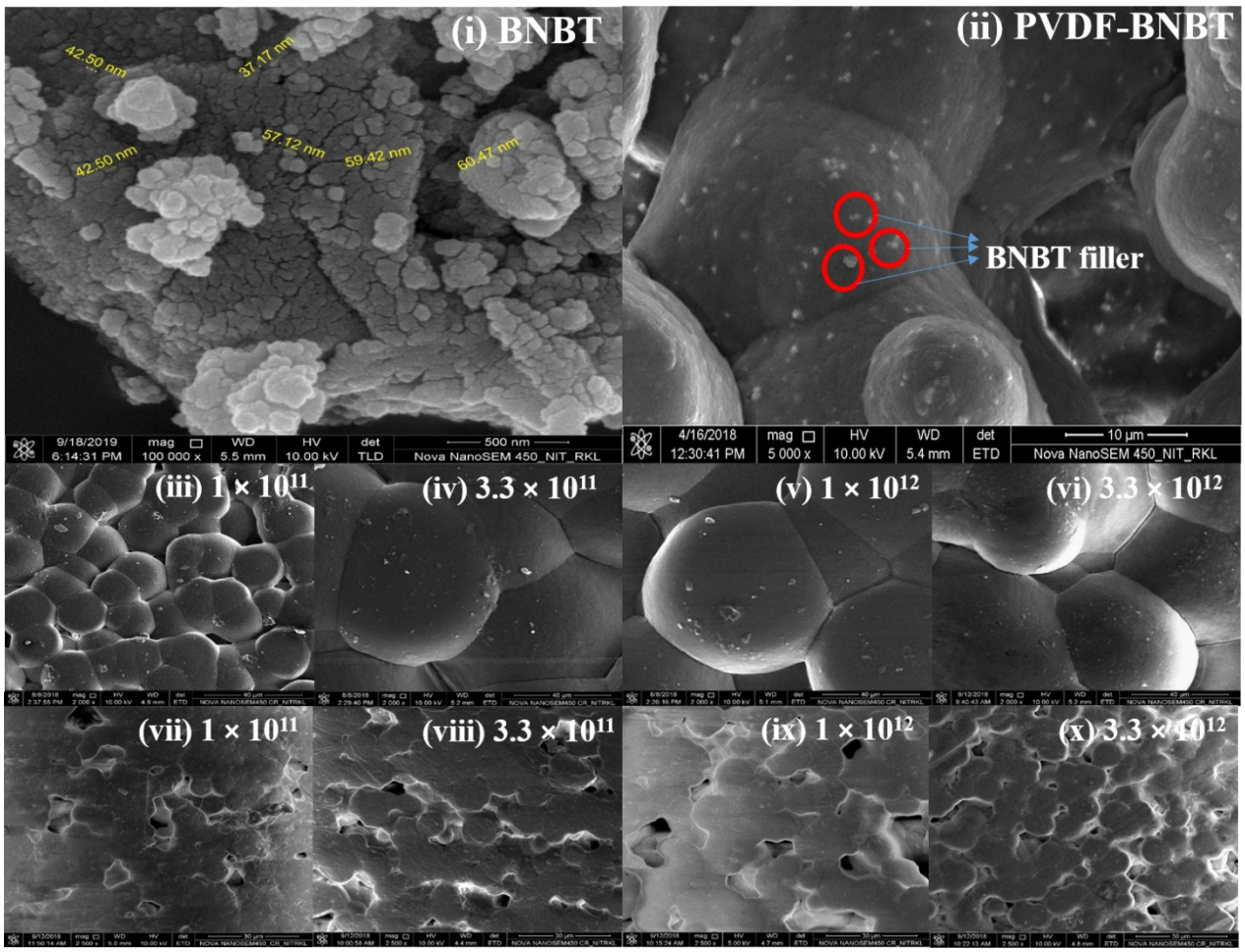


**Fig. S3.** Energy dispersive X-ray (EDX) spectra of $Li^{3+}$ ion-irradiated (a) PVDF and (b) PVDF-BNBT composite for highest fluence of $3.3\times10^{13}$ ions $cm^{-2}$.

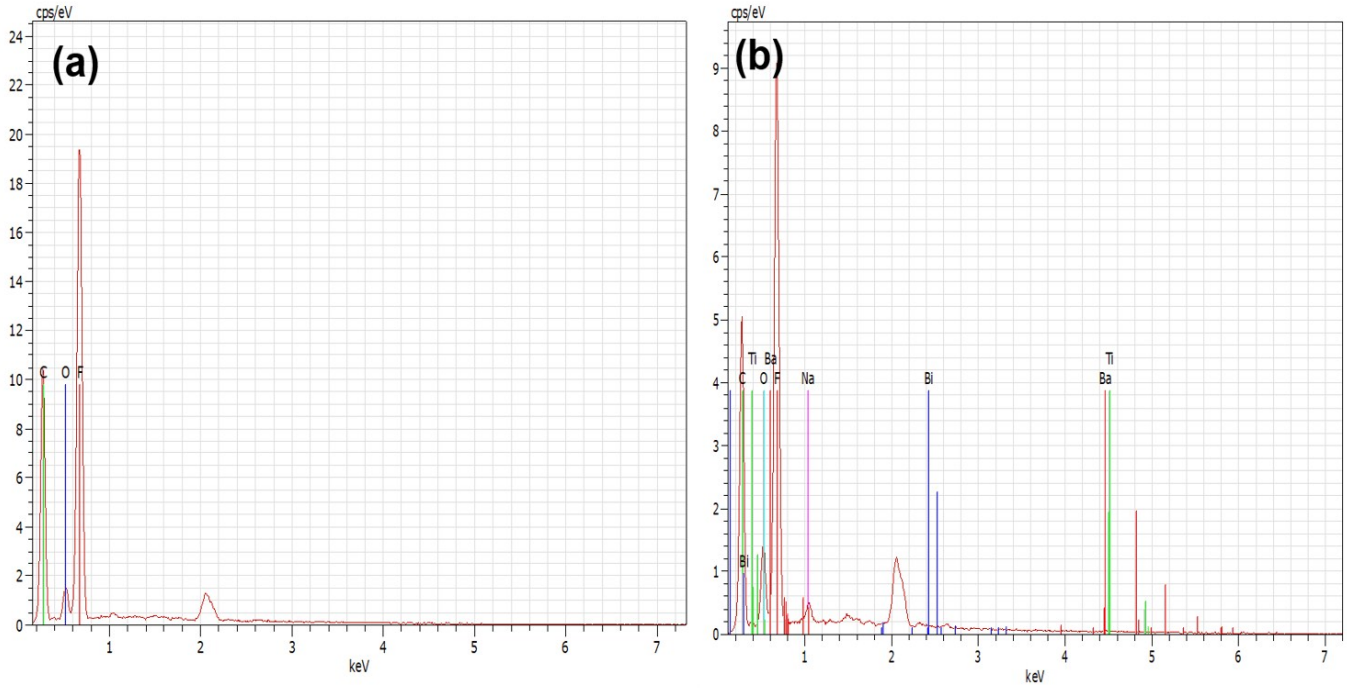


**Table S1.** Crystallite size and % of crystallinity ($X_c$) (calculated from XRD analysis) before and after irradiated PVDF, PVDF-BNBT composites at indicated fluence. The number "0" indicates the zero fluence or pristine polymer/composite (before irradiation).

| Sl. No. | Fluence (Ions/cm$^2$) | 2θ (Deg.) | Crystallite size D (Å) | $X_c$ (%) | 2θ (Deg.) | Crystallite size D (Å) | $X_c$ *(%)* |
|---|---|---|---|---|---|---|---|
| | **PVDF** | | | | **PVDF-BNBT** | | |
| 1 | 0 | 20.28 | 69 | 43.1 | 20.26 | 61 | 55.3 |
| 2 | $1\times10^{11}$ | 20.30 | 71 | 44.2 | 20.26 | 96 | 56.4 |
| 3 | $3.3\times10^{11}$ | 20.30 | 73 | 44.9 | 20.30 | 99 | 57.1 |
| 4 | $1\times10^{12}$ | 20.35 | 76 | 45.7 | 20.36 | 103 | 57.9 |
| 5 | $3.3\times10^{12}$ | 20.37 | 76 | 46.8 | 20.36 | 105 | 58.8 |
| 6 | $1\times10^{13}$ | 20.40 | 78 | 47.7 | 20.42 | 110 | 60.1 |
| 7 | $3.3\times10^{13}$ | 20.43 | 83 | 46.1 | 20.48 | 117 | 59.2 |