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# Supporting information

## The effect of reduced graphene oxide on the dielectric and ferroelectric properties of PVDF-$BaTiO_3$ nanocomposites

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Electronic supplementary information

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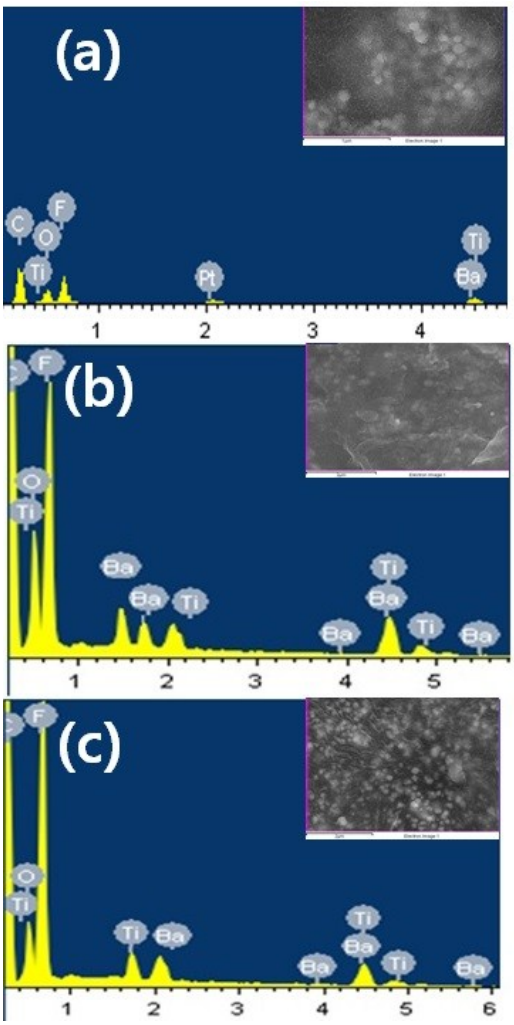
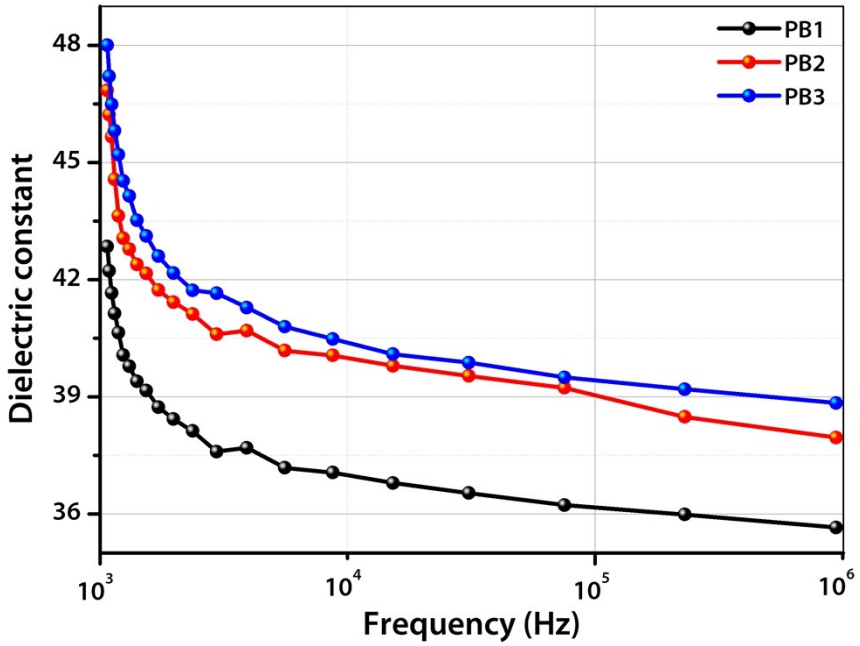



| Element | Weight% | Atomic% |
|---|---|---|
| C K | 39.96 | 58.97 |
| O K | 12.22 | 13.54 |
| F K | 24.91 | 23.23 |
| Ti K | 4.91 | 1.82 |
| Ba L | 18 | 2.44 |
| Totals | 100.00 | |

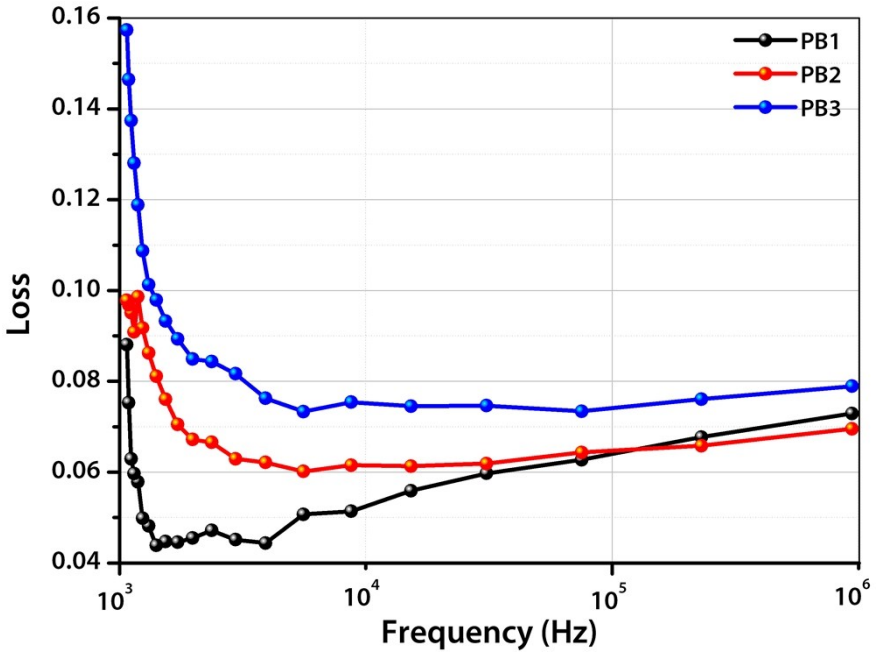
| Element | Weight% | Atomic% |
|---|---|---|
| C K | 45.74 | 62.48 |
| O K | 11.08 | 11.36 |
| F K | 25.95 | 22.41 |
| Ti K | 4.56 | 1.74 |
| Ba L | 12.67 | 2 |
| Totals | 100.00 | |

| Element | Weight% | Atomic% |
|---|---|---|
| C K | 51.15 | 65.9 |
| O K | 6.54 | 6.39 |
| F K | 31.50 | 25.92 |
| Ti K | 2.64 | 0.86 |
| Ba L | 8.16 | 0.93 |
| Totals | 100.00 | |

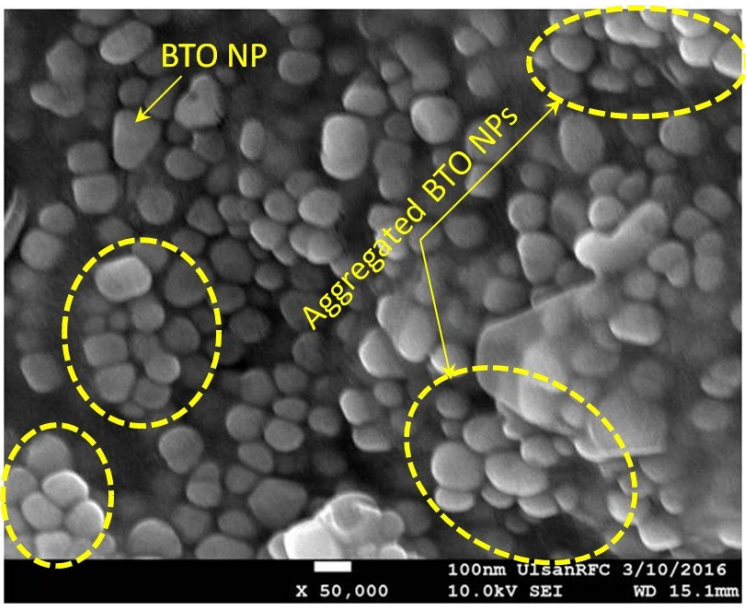
Figure S1. EDS results for (a) PRB1, (b) PRB2, and (c) PRB3 nanocomposites.


PB1
PB2
PB3
Dielectric constant
48
45
42
39
36
$10^3$
$10^4$
$10^5$
$10^6$
Frequency (Hz)

(a)


PB1
PB2
PB3
Loss
0.16
0.14
0.12
0.10
0.08
0.06
0.04
$10^3$
$10^4$
$10^5$
$10^6$
Frequency (Hz)

(b)




(c)

Figure S2. Dielectric properties of the PB1, PB2, and PB3 nanocomposites at different frequencies (a) dielectric constant (b) dielectric loss (c) SEM image of the PB3 sample.

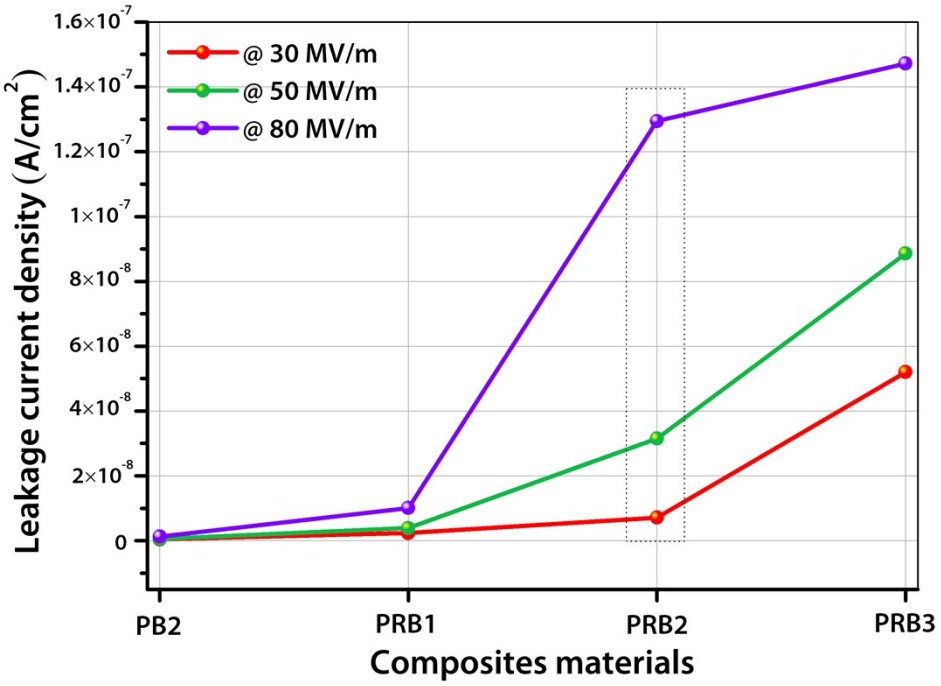



Figure S3. Leakage current density variations of PB2, PRB1, PRB2, and PRB3 nanocomposites at different electric fields

Table S1. Summary of Raman and FTIR peaks for PVDF-RGO-BTO nanocomposites.

| Analysis | Samples | PVDF related peaks ($cm^{-1}$) | | | | | | BTO related peaks ($cm^{-1}$) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Peaks | 167 | 802 | 811 | 839 | 881 | 1170 | 185 | 258 | 308 | 515 | 720 |
| Raman spectra | PB2 | - | α | - | β | All | - | C | T | T | C | T |
| | PRB1 | - | - | γ | β | All | β | C | T | T | C | T |
| | PRB2 | β | - | γ | β | All | β | - | T | T | - | T |
| | PRB3 | β | - | γ | β | All | β | - | T | T | - | T |

| Analysis | Samples | Peaks | 760 | 797 | 838 | 876 | 1175 | 433 | 577 | 585 |
|---|---|---|---|---|---|---|---|---|---|---|
| FTIR spectra | | PB2 | A | α | β | β | β | T | T | T |
| | | PRB1 | - | - | β | β | β | T | T | - |
| | | PRB2 | - | - | β | β | β | T | T | - |
| | | PRB3 | - | - | β | β | β | T | T | - |

Where:

α = alpha phase of PVDF

β = beta phase of PVDF

T = tetragonal phase of $BaTiO_3$

T = cubic phase of $BaTiO_3$