Supplementary Information

Controllable dielectric performance of polymer composites via Coulomb-blockade effect with core-shell structured nano-particles

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Table S1 Summary of dielectric properties and electrical properties of pure NBR and NBR composites.

Sample	Dielectric constant (100 Hz)	Dielectric loss (100 Hz)	Conductivity $S\ m^{-1}$ (100 Hz)	DC volume resistivity (Ω·cm)	Electrical breakdown strength (kV/mm)	Energy density （kJ/m^3）	Dielectric relaxation time (s)
Pure NBR	12.28	0.026	2.12E-11	1.29E+10	45±5.0	110.08	1.50E-57
TiO_2/NBR	12.84	0.039	3.11E-11	3.02E+09	41±4.4	105.03	1.60E-78
TiO_2-PDA/NBR	12.96	0.033	2.83E-11	3.29E+09	43±2.8	96.40	1.30E-59
TiO_2-PDA-Ag30/NBR	12.55	0.129	1.22E-10	1.91E+09	30±3.2	49.97	8.10E-81
TiO_2-PDA-Ag60/NBR	12.10	0.075	6.41E-11	1.23E+09	35±2.4	65.61	3.30E-85
TiO_2-PDA-Ag90/NBR	11.72	0.057	5.37E-11	8.69E+08	39±3.8	78.86	2.50E-133

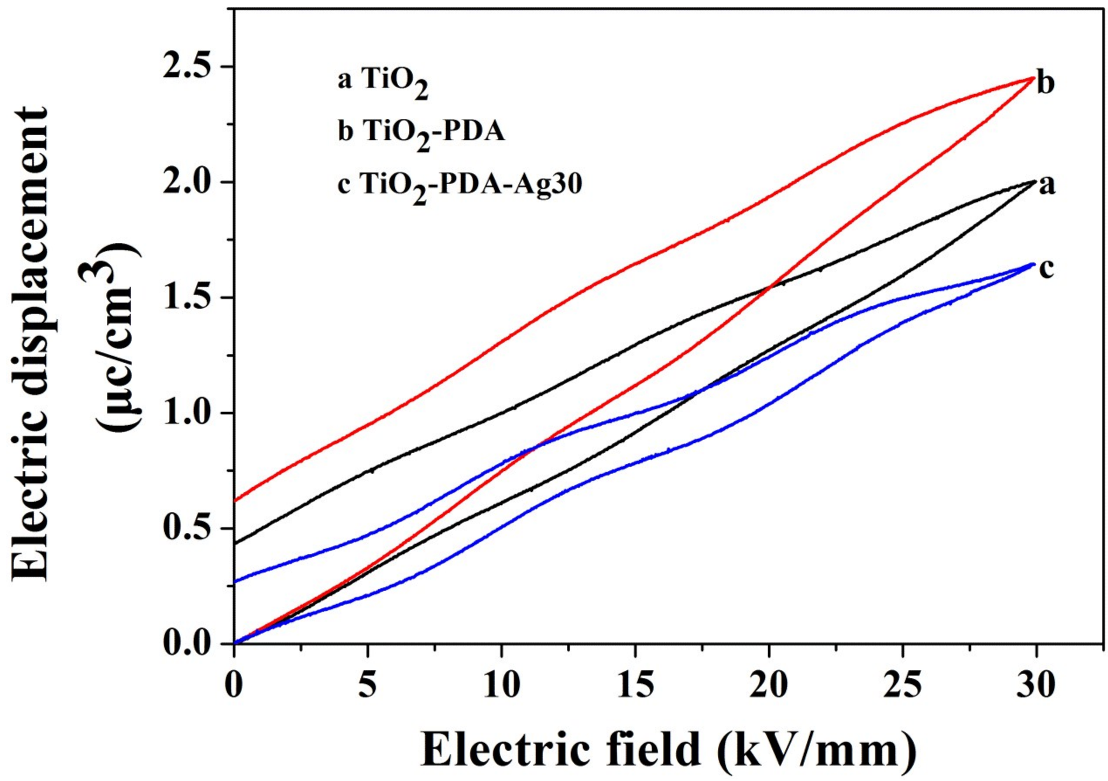

Figure S1 Displacement-electric field (D-E) loops of NBR composites at a field of 30 kV/mm.

Figure S1 shows the displacement-electric field (D-E) loops of NBR composites filled with TiO_2, TiO_2-PDA, and TiO_2-PDA-Ag particles at a field of 30 kV/mm. From Figure S1, we can find the maximal electric displacement is obtained by TiO_2-PDA/NBR composite, while the TiO_2-PDA-Ag/NBR composite displayed the minimum electric displacement. This phenomenon maybe attributed to the difference of dielectric constant of the samples.[1] In addition, the TiO_2-PDA-Ag/NBR composite exhibits the narrowest D-E loops and the lowest remnant polarization in comparison with the TiO_2 /NBR composite and TiO_2-PDA/NBR composite.

Reference

1. K. Yang, X. Huang, J. He and P. Jiang, *Adv Mater Inter*, 2015, 2, 1500361.