# Supplementary Information

**Experimental details:**

Barium titanate nanoparticles of sub-100 nm diameters were synthesized using hydrothermal approach. Polyvinylidene fluoride (PVDF) (M=420 000) was purchased from Solvay Solexis Inc. and was chosen as the polymer matrix. The coupling agent used is dopamine hydrochloride purchased from Sigma-Aldrich. The dopamine was dissolved in mixture solvent Dimethylformamide (DMF) and $H_2O$ and stirred for 30 mins. The ratio of $BaTiO_3$ and dopamine is 2.53 for 1 mmole dopamine modification. After that, the $BaTiO_3$ nanopowder (1g) was added in the solution. Ultrasonication was done for 30 mins until the solution changes into yellow color. The covalent bonding is formed between dopamine and $BaTiO_3$ nanoparticle by refluxing method. The yellow color solution changes into brown color during refluxing. After refluxing, the resulting products were washed with water for three times and collected by centrifuge in order to remove the residual free surfactant. Washed powders were dried for 12 hrs at 100 °C on a hot plate. Fourier transform Infrared spectra (Perkin-Elmer system 2000 FT-IR) were used to characterize the nanoparticles. The composites were prepared by simple blending method. The thin film was drop-coated onto a clean glass slide and dried at 60 °C followed by heating at 200 °C for 5 mins. The film thickness of ~20 μm was used in this investigation. Platinum electrodes were sputtered on both sides of the samples for testing the electrical properties. Field emission scanning electron microscopy (FE-SEM, JEOL 7600F), operating at 5 kV was employed to determine the composite morphology. Frequency-dependent capacitance and loss tangent were measured using Agilent E4980A.

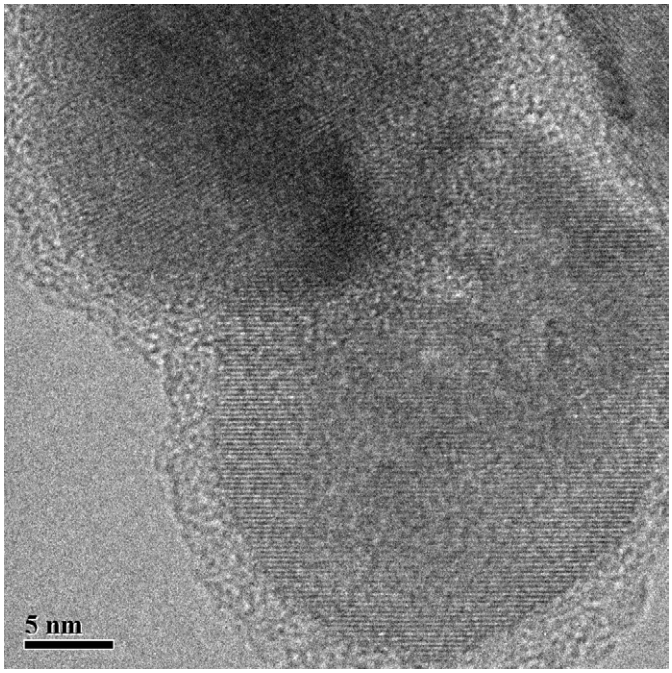


Fig. S1 The TEM image of dopmaine grafted on the $BaTiO_3$ particle surfece with 4 mmole dopamine