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## Supporting Information

## Surface-Modified TiO<sub>2</sub> Nanorod Array/P(VDF-HFP) Dielectric Capacitor with Ultra High Energy Density and Efficiency

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**Figure S1.** FTIR spectra of (a) TNA before and after the surface modification; (b) TNA after modification and dopamine hydrochloride powder.

**Table S1.** The frequencies of experimental peaks of modified TNA's FTIR spectra correspond to the dopamine vibrations.

Wavenumber(cm <sup>-1</sup> )	Dopamine Vibration
1616	Arom. $\sigma_{PP}(\nu_{PP})$
1599	β₂₂ <sub>□</sub> ,asym
1514	Arom. $\sigma_{22}(v_{222})$
1501	Arom. $\sigma_{\mathbb{PP}}(v_{\mathbb{PPP}})$
1470	Arom. $\sigma_{\mathbb{PP}}(v_{\mathbb{PPP}})$
1443	$\beta_{\mathbb{Z}\mathbb{Z}_{\mathbb{Z}}}$ (scissoring, C8)
1321	$\beta_{\mathbb{ZZ}}$ (in – phase)
1286	$\tau_{\mathbb{Z}\mathbb{Z}_{\mathbb{Z}}}$ (torsion, C8)
1204	$\beta_{222}$ (out – of – phase)
1148	Arom. $\beta_{\mathbb{Z}}$ (C5/C6)



Figure S2. FTIR spectra of pure P(VDF-HFP).

**Table S2.** The frequencies of experiment peaks of pure P(VDF-HFP)'s FTIR spectra correspond to the vibration.

Wavenumber I cm <sup>-1</sup> I	Phase type	Vibration
613	α	CF <sub>2</sub> bending and wagging I PVDF chain rocking
762	α	
797	α	
841	β	CH <sub>2</sub> rocking
854	α	
873	β	CH <sub>2</sub> rocking and CF <sub>2</sub> streching
976	α	
1180	β	CH <sub>2</sub> rocking and wagging
1281	β	



**Figure S3.** Element mappings of the section of TNA/P(VDF-HFP).



Figure S4. D-E loops of TNA/P(VDF-HFP) with different spin-coating times.



Figure S5. Schematic illustration for the D-E loop measurement of TNA/P(VDF-HFP).



Figure S6. Sectional view SEM image of unmodified TNA/P(VDF-HFP).



**Figure S7.** XPS spectrum of TNA before dopamine modification (black line) and after dopamine modification (red line). The presence of nitrogen containing groups, as indicated by the peaks of N 1s electrons, after coating process can be easily distinguished.



**Figure S8.** TGA spectra of Composite-5 and P(VDF-HFP). The TiO<sub>2</sub> weight ratio of Composite-5 is about 4.8%, and corresponding to the volume fraction  $\sim 2.1\%$ .