Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information:

Self-Supported Carbon Coated TiN Nanotube Arrays: Innovative Carbon Coating Leads to Improved Cycling Ability for Supercapacitor Applications

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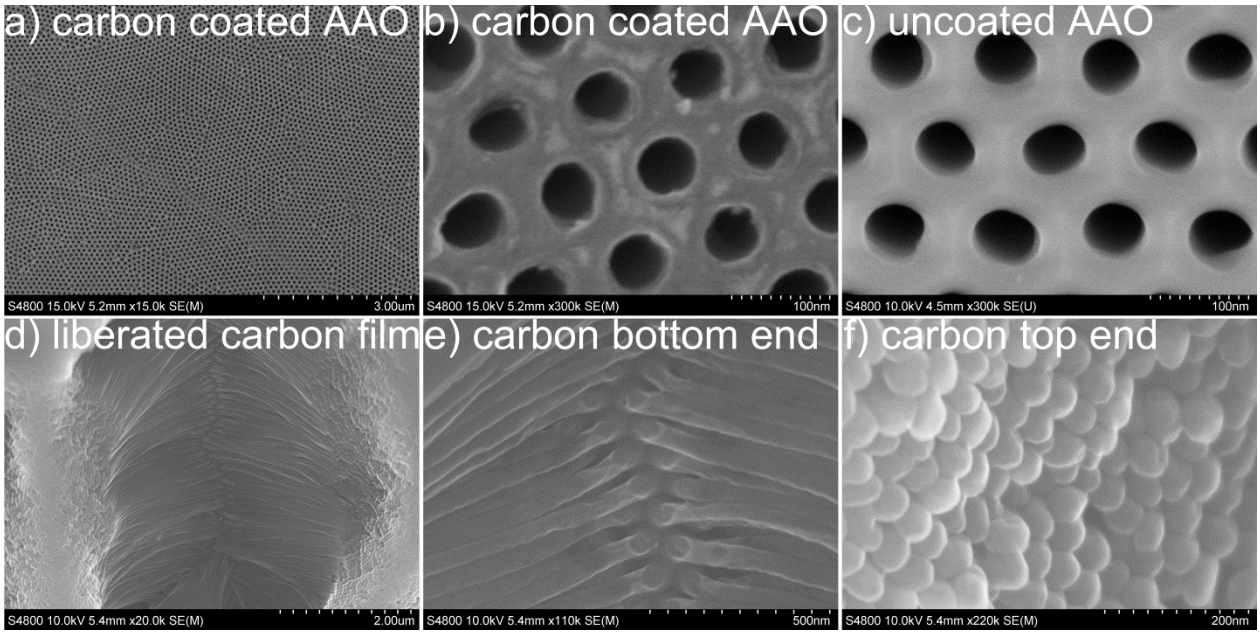

Figure S1. a,b) Overview and large magnification SEM images of a carbon coated AAO template, showing the well preserved nano-porous AAO morphology after coating; c) Uncoated AAO template for comparison; d) Top-view SEM image of liberated carbon nanotubes after AAO template removal; e) High magnification of the carbon nanotube bottom end; f) High magnification of the closed top-ends of the carbon nanotubes (originating from the AAO barrier layer), proving the formation of a continuous carbon layer on the AAO template by the developed fabrication technique.

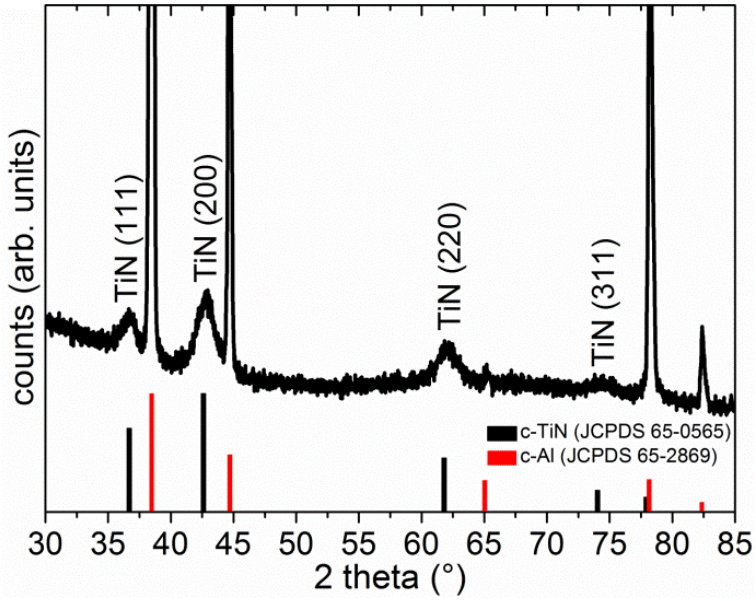

Figure S2. XRD measurement of the C-TiN nanotube array, showing the formation of polycrystalline cubic TiN (Reference: JCPDS 65-0565). The signal of cubic Al originates from the sample substrate.

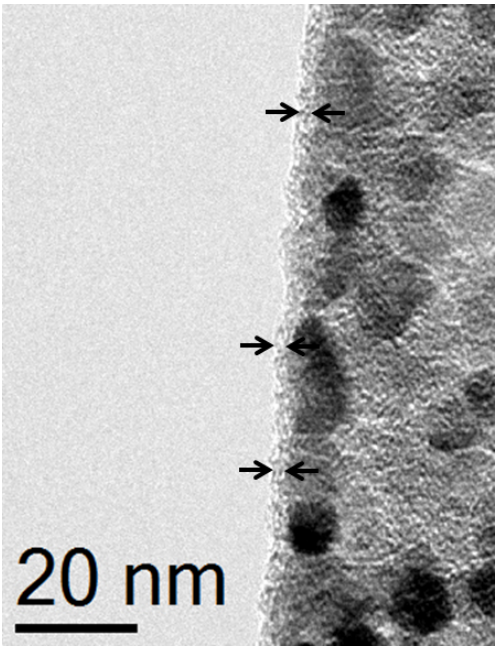

Figure S3. TEM image of the C-TiN nanotube wall, indicating a carbon layer thickness of ca. 2 – 3 nm.

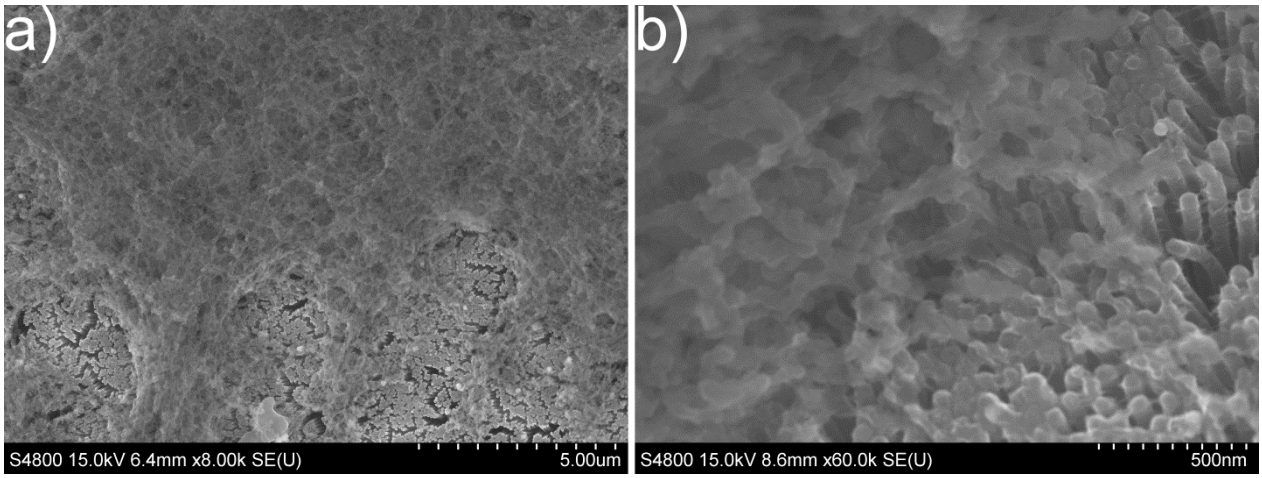

Figure S4. a, b) Overview and high resolution SEM images of a TiN nanotube array fabricated via route A and the subsequent coating of carbon by the described PNM approach. The images clearly show that the TiN nanotube array is not coated in a conformal manner as achieved by route B. Moreover, a thick carbon film covers the nanotube array to great extent.

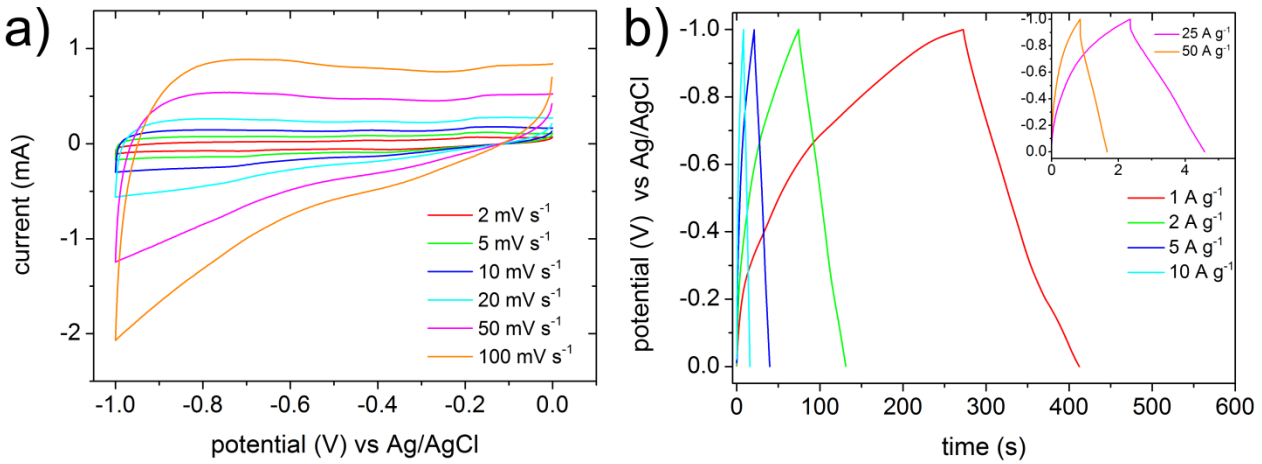

Figure S5. a) CV and b) charge/discharge performance of the bare TiN nanotube array.

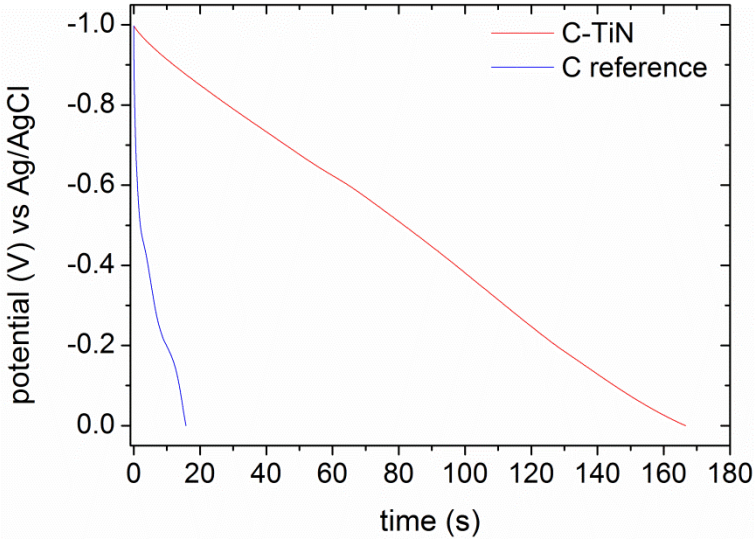

Figure S6. Charge/discharge performance of the C-TiN nanotube array at 1 A g^{-1} in comparison to a bare C nanotube array without TiN deposition. From this comparison it is shown that the bare C nanotube array contributes about 9.5 % to the C-TiN performance.