

Supporting information

Thermal Relaxation in Combination with Fiber Glass Confined Interpenetrating Network: A Key Calcination Process for As-Desired Free Standing Metal Oxide Nanofibrous Membrane

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Supporting Information

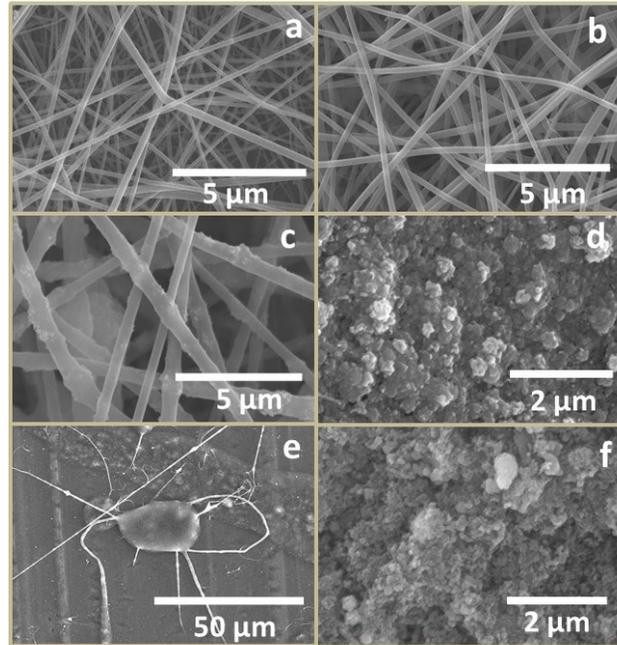


Figure S1. (a) SEM images of electrospun nanofibers from the solution precursor containing AMT, (b) AMT and ZAH, (c) AMT, ZAH, and P25 nanoparticles and AMT, (e) ZAH and TIP in a solvent mixture of water and ethanol. Calcination of sample (c) at (d) 500 °C and sample (e) at (f) 500 °C.

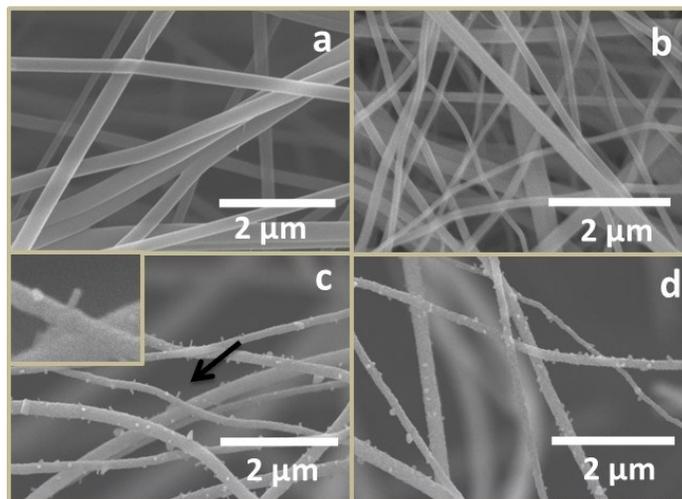


Figure S2. (a) SEM images of electrospinning solution precursor containing AMT, ZAH, and TIP in a solvent mixture of ethanol and DMF. Calcination of sample (a) at (b) 500 °C, (c) 600 °C and (d) 700 °C.

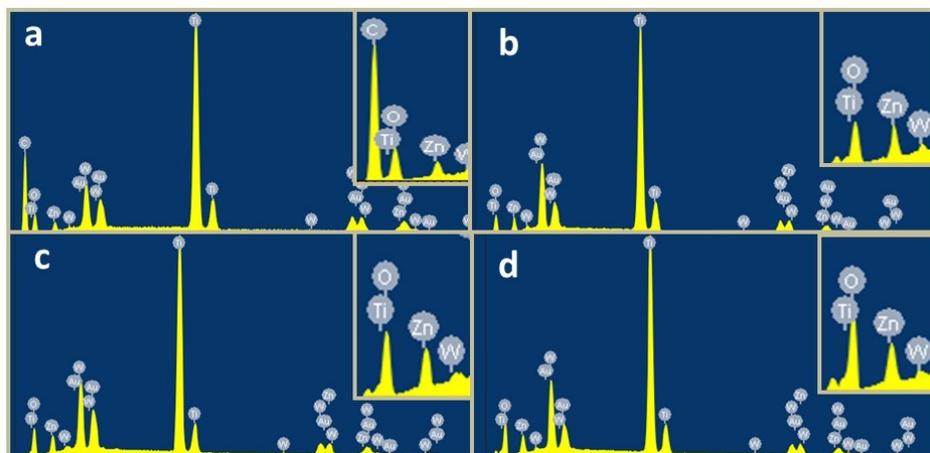


Figure S3. (a) SEM-EDX of the nanofibers before calcination showing carbon content and after calcination at (b) 500 °C, (c) 600 °C, (d) 700 °C.

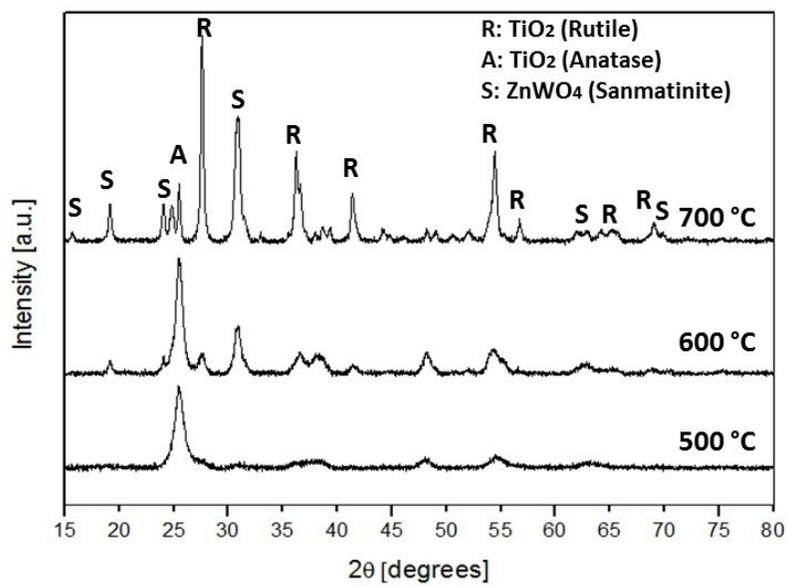


Figure S4. XRD patterns of ZnWO₄/mixed-phased TiO₂ nanofibers at different calcination temperatures.

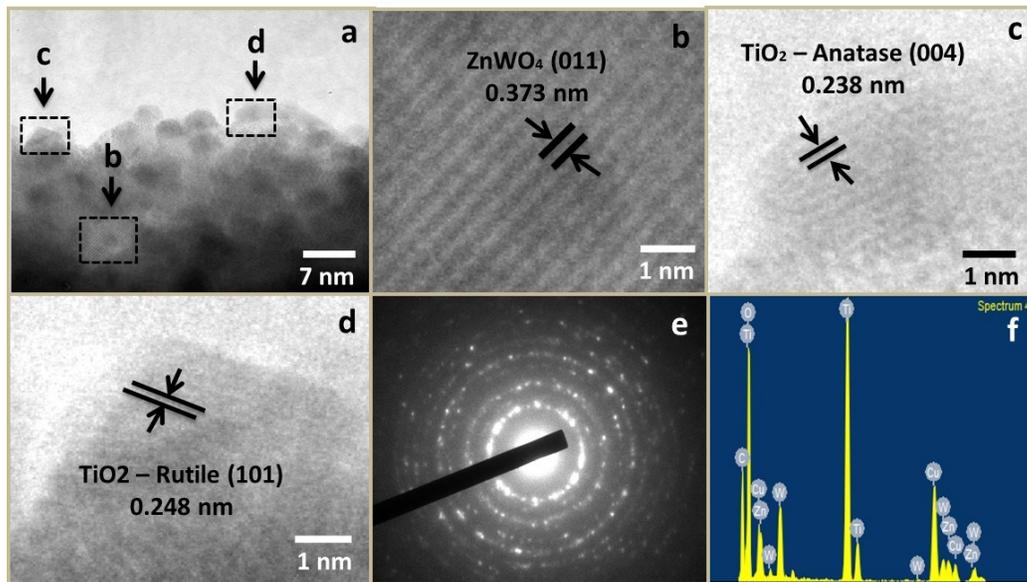


Figure S5. (a) TEM, (b-d) HRTEM, (e) SAED, and (f) TEM-EDX images of ZnWO₄/mixed-phased TiO₂ nanofibers after calcination at 600 °C.

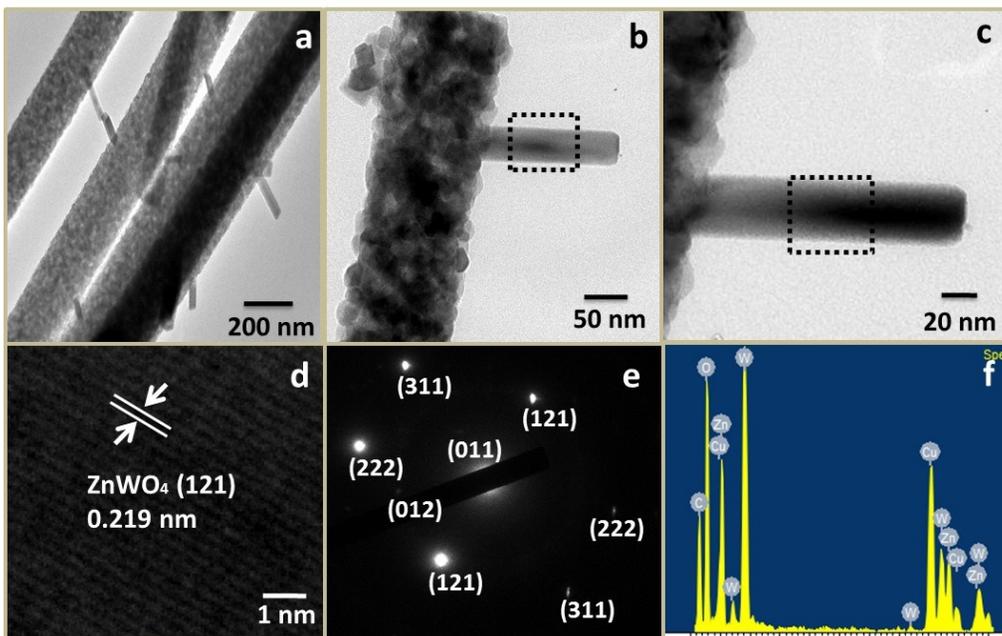


Figure S6. (a) TEM, (b-d) HRTEM, (e) SAED, and (f) TEM-EDX images of grown ZnWO₄ nanorod on ZnWO₄/mixed-phased TiO₂ nanofibers after calcination at 600 °C.

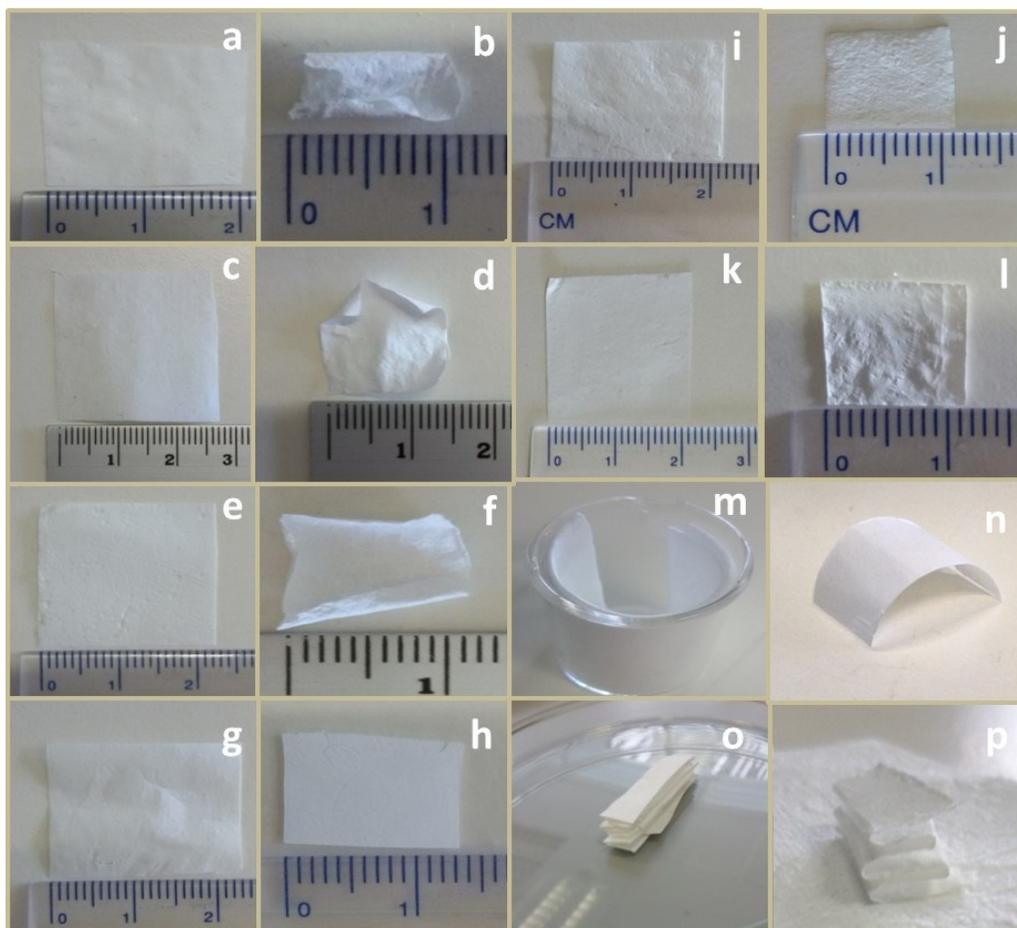


Figure S7 (a, c, e, g, i, k, m and o) Pictures of electrospun nanofibers before calcination. (b) Sample in (a) after calcination at 600 °C. (d) Sample in (c) after calcination by 100-AC processes. (f) Sample in (e) after 200-AC processes. (h) Sample in (g) after 100-AC processes while sandwiched between two fiber glass fabrics. (j) Sample in (i) after 200-AC processes while sandwiched between fiber glass fabrics. (l) Sample in (k) after 200-AC processes while sandwiched between glass slides. (n) Sample in (m) after 200-AC processes with controlled bending shape by fiber glass fabrics in a beaker. (p) Sample in (o) after 200-AC processes with controlled folding shape by fiber glass fabrics.

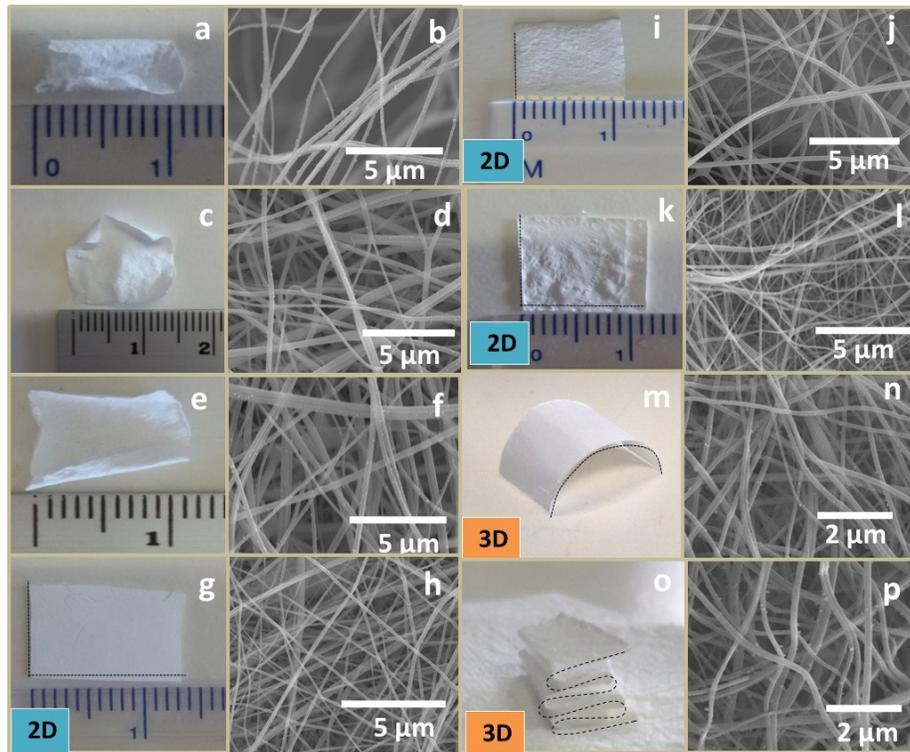


Figure S8 (a, c, e, g, i, k, m and o) Pictures of nanofibrous membranes after various thermal treatment. (b, d, f, h, j, l, n and p) SEM images of each membrane.

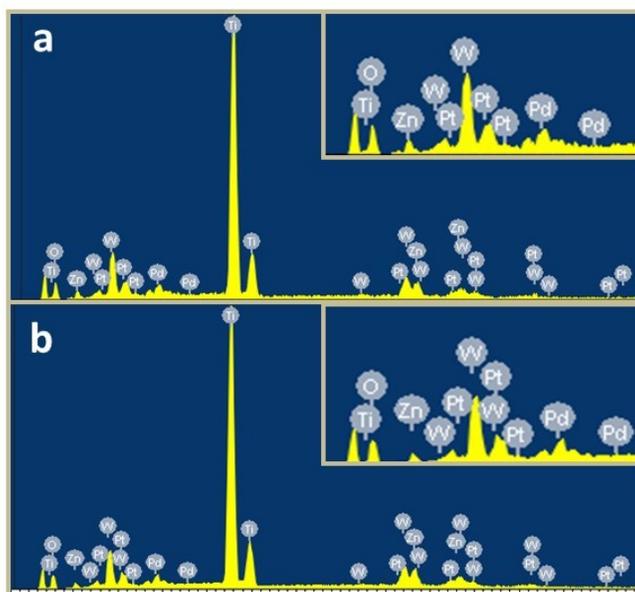


Figure S9 SEM-EDX of Pd/Pt-TiO₂-ZnWO₄ nanofibers by (a) visible and (b) UV light photodeposition method.

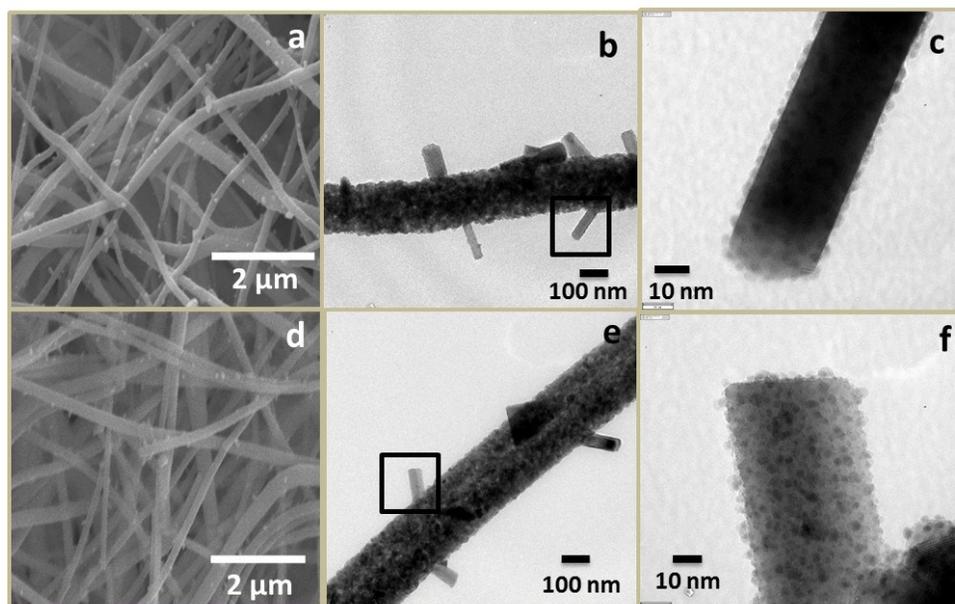


Figure S10. (a-c) SEM, TEM and HRTEM images of photodeposited Pt and Pd on $\text{ZnWO}_4/\text{mixed-phase TiO}_2$ nanofibers under visible light and (d-f) UV light.



Figure S11 (a) Photodeposition activity under natural sunlight and (b) sunlight intensity measurement by Lux meter.