

## Tungsten doped titanium dioxide nanowires for high efficiency dye-sensitized solar cells

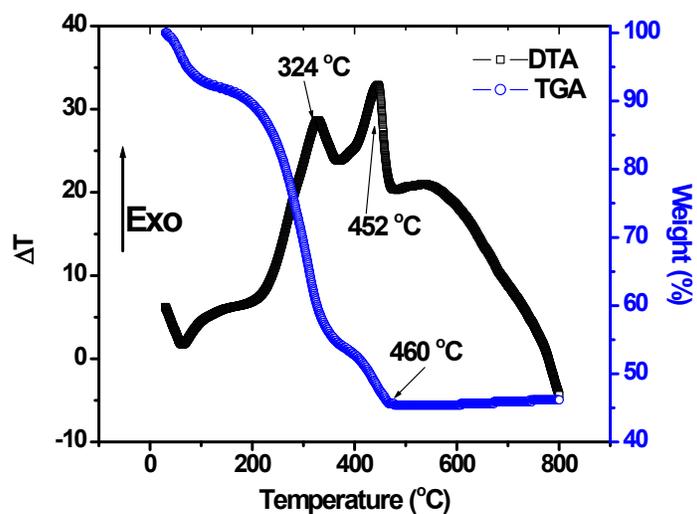
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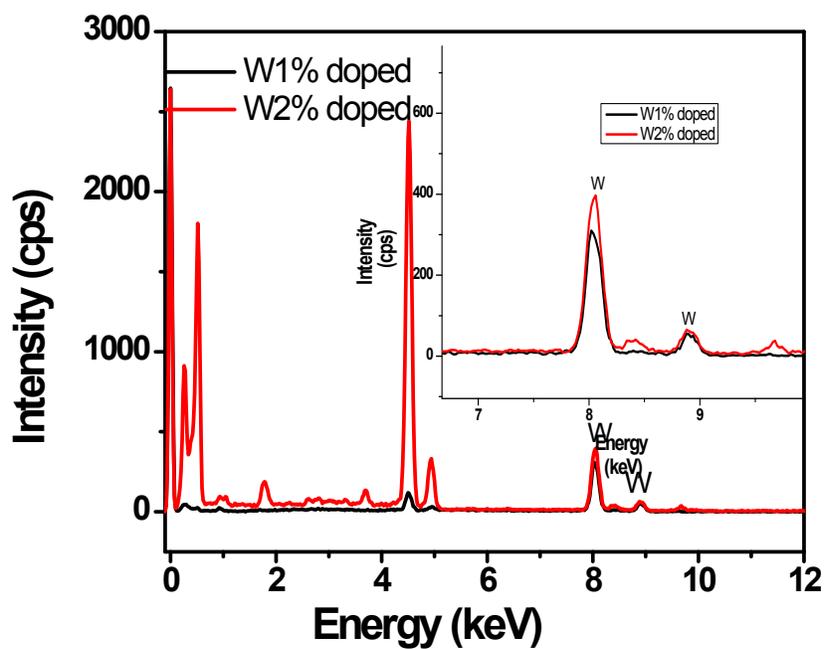
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S1: Thermal analyses results of PVAc fiber containing the titanium precursor.

Decomposition of the composite fiber and crystallization behavior were studied by simultaneous differential thermal and thermogravimetric analyzer (STA, DTG-60 AH, Shimadzu, Japan) in the range 30 -800 °C. Figure S1 shows the result of simultaneous thermal analysis of the as-prepared fibers containing the . The as-spun composite polymeric fibers showed usual decomposition of the polymer and formation of inorganic phase in the electrospun polymeric fiber template. Formation of metal oxide nanofibers from composite polymeric fibers containing metal ions involve at least three steps, viz. (i) nucleation of the crystals, (ii) growth, and (iii) directional mass transport, in other words, sintering of the grains. The first two processes typically occur during growth of nanocrystals from solutions. The polymeric fiber containing the niobium ions showed an endothermic peak in the differential thermal analysis (DTA) curve and a weight loss (~10%) in the thermogravimetric analysis (TGA) curve at ~60°C, which is attributed to the liberation of the adsorbed solvents. Following the endothermic event at 60 °C, a major exothermic event and substantial weight loss (40%) was observed at ~300 °C, which results from the decomposition of the polymer. The crystallization and growth of the anatase phase were revealed by an exothermic reaction at starting at ~400 °C; after which weight of the sample remains constant.



S1: X-ray fluorescence spectrum of the tungsten doped samples showing presence of tungsten in the samples.



S2: TEM images of the Nb-doped samples. The bright field images (left panel) and high resolution lattice images (right panels) of (A) 2 at% Nb:TiO<sub>2</sub> and (B) 5 at% Nb:TiO<sub>2</sub>, respectively.

