Electronic Supplementary Information

One-Step Fabrication of Transparent and Conductive TiO_x/Ag Nanowire Hybrid Thin Film with High Robustness†

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Experimental Details

I. Chemicals

Ag NW/ethanol dispersion (10 mg/mL, ~50.3 nm×15.7 μm) was bought from Blue Nano Inc. Titanium isopropoxide (98%), ethanolamine (AR) and 2-methoxyethanol (AR) were purchased from Aladdin Inc.

II. Preparation of TiO_x/Ag NW dispersion

TiO_x sol-gel solution was firstly prepared according to a modified procedure.[1] 2.0 mL of titanium isopropoxide and 1.0 mL of ethanolamine were added into 10.0 mL of 2-methoxyethanol under magnetic stirring. Then, the mixed solution was putted on a hotplate at 100 ^oC for 2 h. Finally, an orange-red TiO_x sol-gel solution was obtained. 1.0 mL of TiO_x sol-gel solution (~40 mg TiO_x) and 1.0 mL of Ag NW/ethanol

dispersion (~10 mg AgNWs) were mixed under magnetic stirring, forming TiO_x/Ag NW dispersion.

Deposition of TiO_x/Ag NW hybrid thin film

TiO_x/Ag NW hybrid thin film was fabricated by a spin-casting process at 2500 rpm for 15 s, followed by a sintering process on a pre-heated hotplate at 180-280 ^oC for 2 min. A multi-step spin-casting method was utilized to achieve TiO_x/Ag NW hybrid thin films with different AgNW densities.

III. Characterizations

The scanning electron microscope (SEM) images were taken using a Hitachi S-4800. UV-vis transmittance spectra were measured by Metash UV-5200. The sheet resistance was measured using a 4-point probe method with a Keithley 2400 source meter (Sheet resistance=measured resistance×4.532). The film thickness and surface roughness were measured by a step profilermeter (AMBIOS, XP-100).

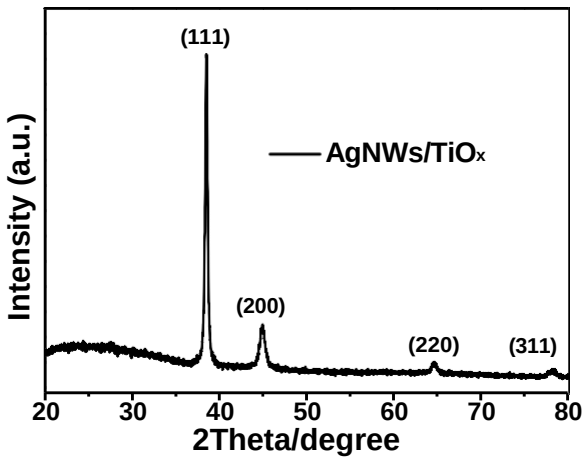

Figure S1 XRD pattern of TiO_x/Ag NW hybrid network

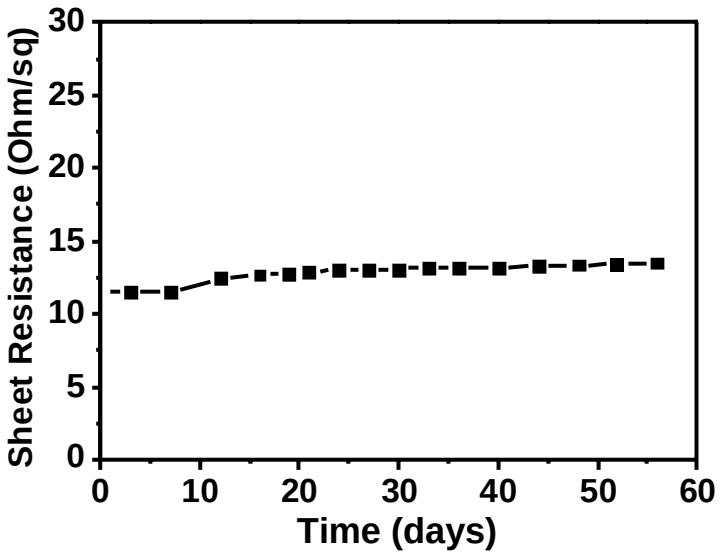

Figure S2. The stability of sheet resistance of transparent and conductive TiO_x/Ag NW hybrid thin film.

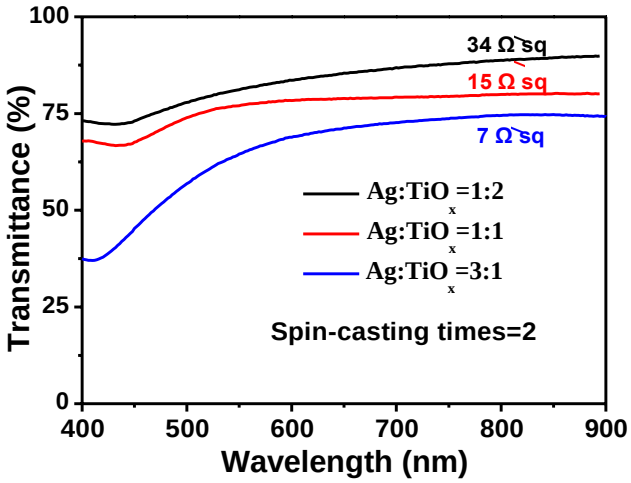

Figure S3 The transmittance spectra and sheet resistance of TiO_x/Ag NW hybrid thin films with different Ag/TiO_x volume ratios.

Reference

1. J. Y. Kim, K. Lee, N. E. Coates, D. Moses, T. Q. Nguyen, M. Dante and A. Heeger, *Science*, 2007, **317**, 222-225.