Electronic Supplementary information (ESI) *for*

Feather - like Ag@TiO_2 Nanowires as Plasmonic Antenna to Enhance Optoelectronic Performance

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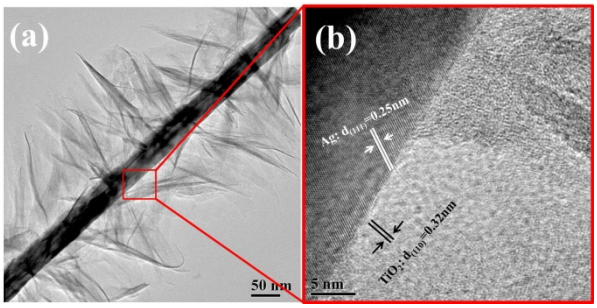

Figure S1. (a) The low-magnification TEM image of $Ag@TiO_2$; (b) The HRTEM image of $Ag@TiO_2$.

The low-magnification TEM image (Figure S1a) shows that the silver nanowires are encapsulated by feather-like TiO_2. The HRTEM image (Figure S1b) of the silver core demonstrates that the marked interplanar *d* spacing of 0.25 nm correspond to that of the (111) lattice planes of the fcc silver. The HRTEM image of the feather-like TiO_2 (Figure S1b) indicates that the spacing of adjacent fringes of the bristles is 0.32 nm, corresponding to the spacing of the (110) planes of the rutile TiO_2. The TiO_2 layer coated on the Ag nanowire (excluding the TiO_2 spines) is very thin and difficult to observe. Therefore, the transverse plasma resonance of Ag nanowire will not be affected.

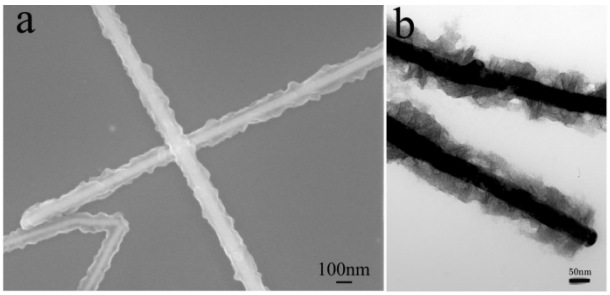

Figure S2. SEM (a) and TEM (b) of the relatively smooth surface Ag@TiO_2 nanowire under 200°C.

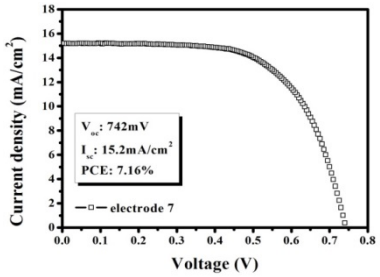

Figure S3. Typical photocurrent-voltage characteristics of electrode 7 with the relatively smooth surface Ag@TiO_2 nanowire (The sensitizer is N719. The cell active area is 0.15 cm^2, and the light intensity is 100 mW/cm^2).

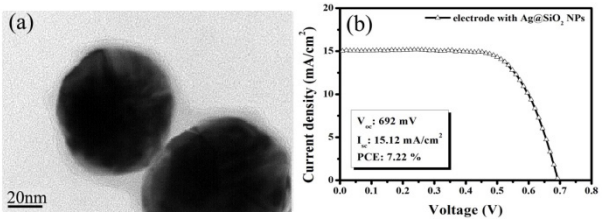

Figure S4. (a) The low-magnification TEM image of $Ag@SiO_2$; (b) Typical photocurrent-voltage characteristics of photo anode (electrode 8) with $Ag@SiO_2$ nanoparticles (The sensitizer is N719. The cell active area is 0.15 cm^2, and the light intensity is 100 mW/cm^2).

The $Ag@SiO_2$ nanoparticles were prepared and introduced them into photo anodes, as shown in Figure S4. Ag NPs were synthesized by the citrate reduction method [1]. The diameter of Ag nanoparticles were ~60nm. To prevent Ag nanoparticle from corrosion in electrolyte, Ag nanoparticles were coated by thin SiO_2. The outside thickness of SiO_2 shell was 4~5nm, as shown figure S4a. Thus, the electrode with $Ag@SiO_2$ nanoparticles were measured, as shown figure S4b. The TiO_2 film anchored $Ag@SiO_2$ showed short circuit current density (15.12 mA/cm^2), open circuit voltage (692 mV) and energy conversion coefficient (7.22%).

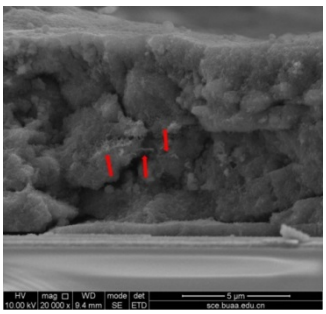

Figure S5. SEM cross section view of the prepared anode with Ag@TiO_2 (indicated by the red arrow).

Reference:

[1] P. C. Lee, D. Meisel, *J. Phys. Chem.* 1982, ***86***, 3391.