

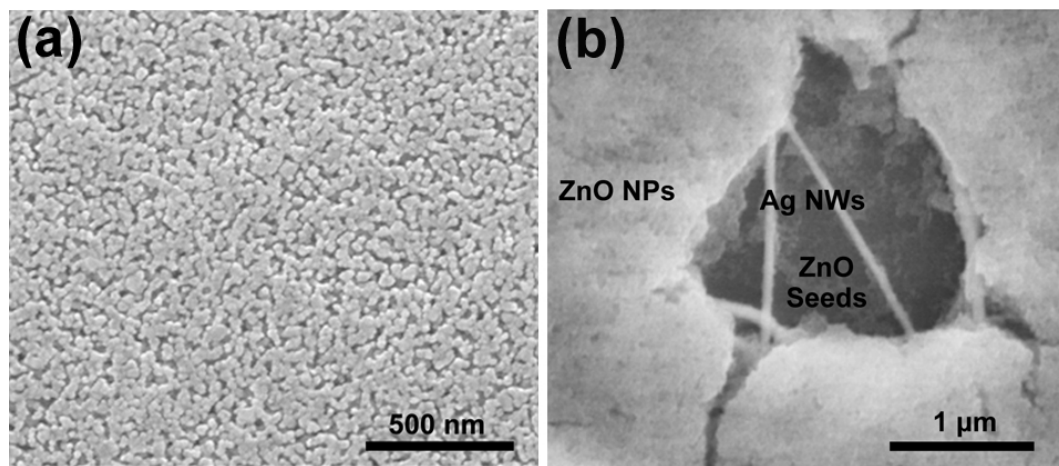
## Supporting information

High-Performance ZnO/Ag Nanowires/ZnO Composite Film UV Photodetectors with Large Area and Low Operating Voltage

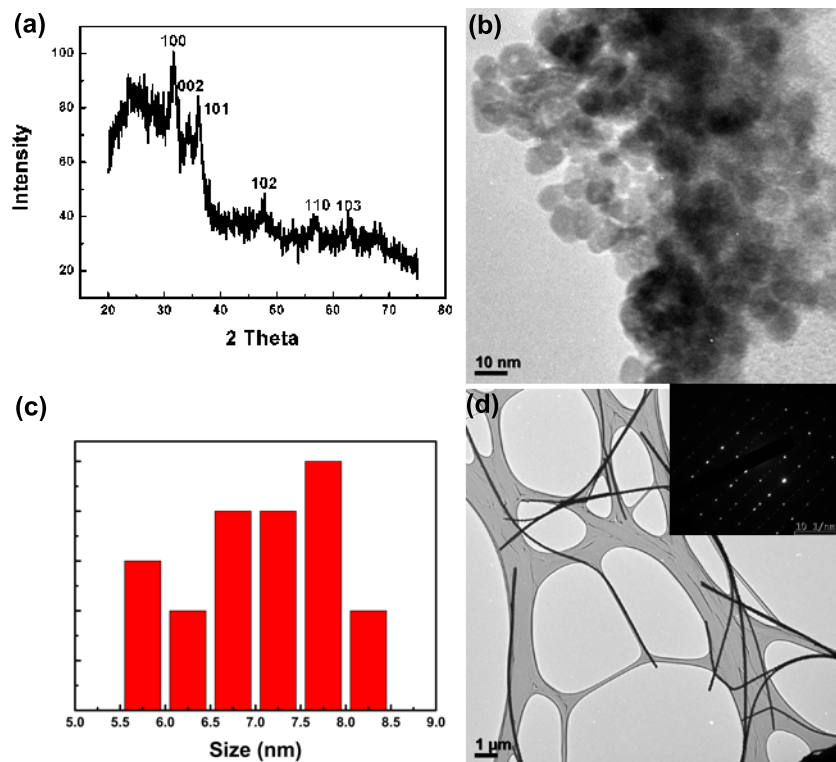
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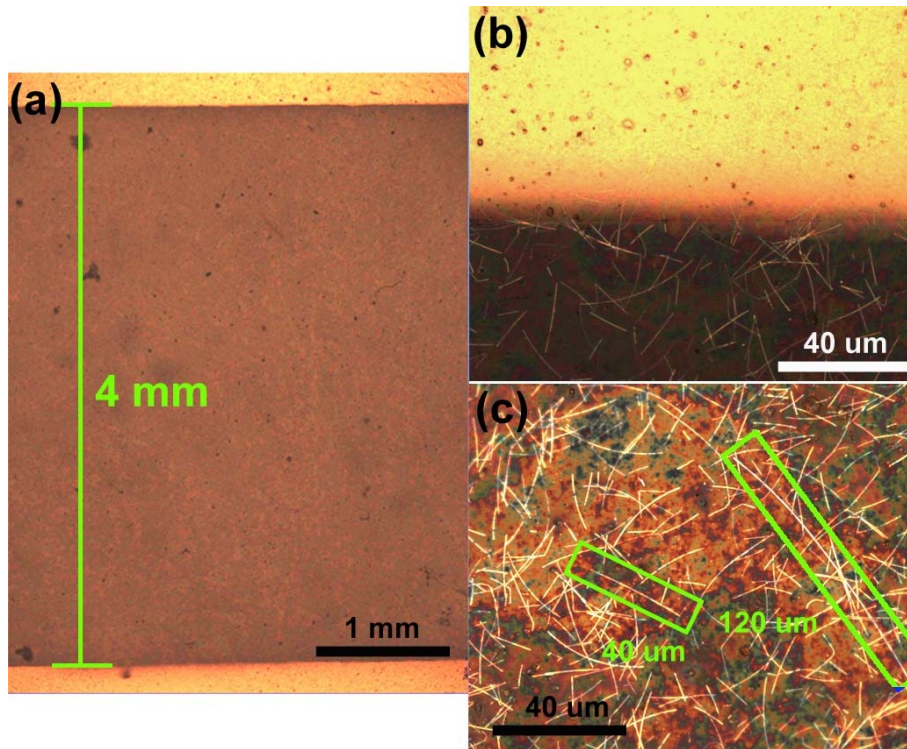
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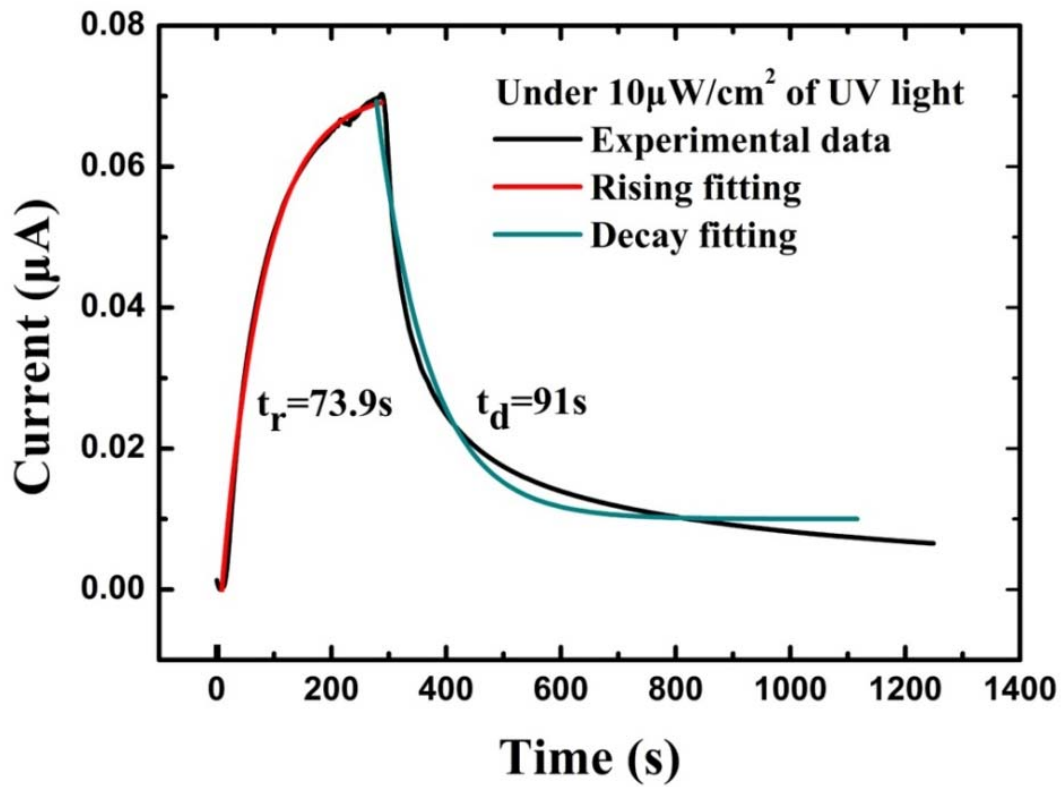
**Figure S1.** (a) SEM image of bottom ZnO layer. (b) SEM image of ZnO/AgNWs/ZnO composite UV photodetector. An area with discontinues upper ZnO layer is chosen to indicate three layers structure clearly.



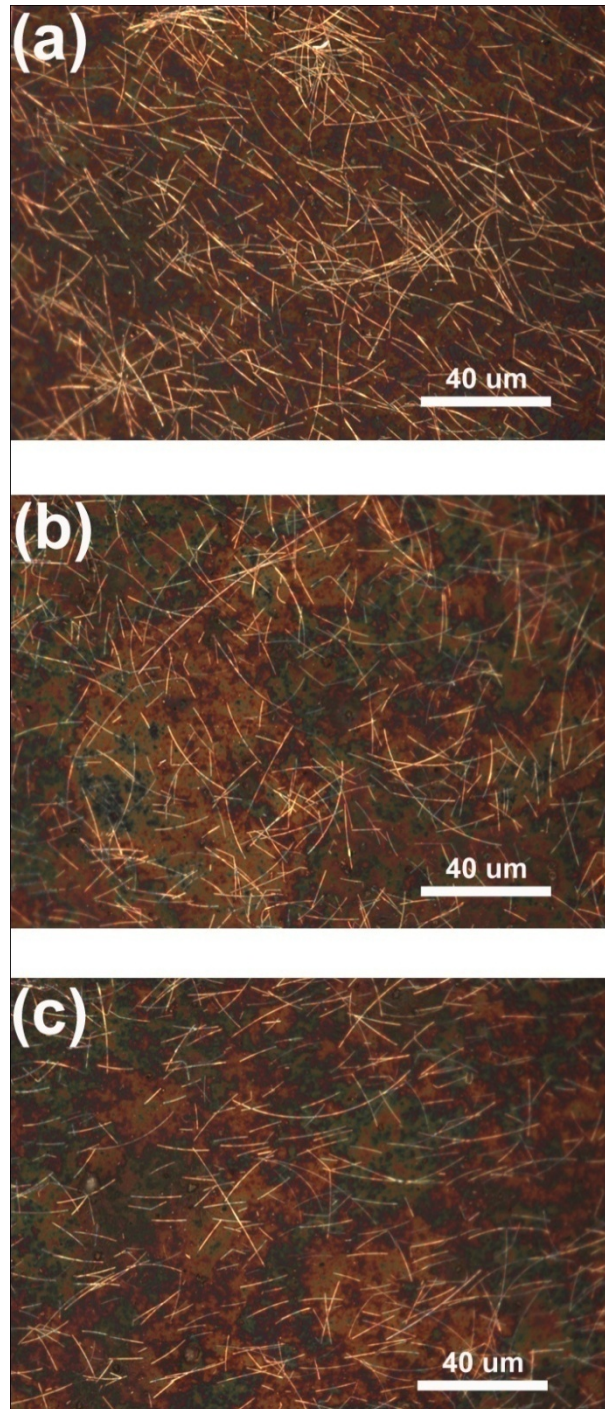
**Figure S2.** (a) XRD of bottom ZnO layer. (b) TEM image of upper coated ZnO NPs layer, the NPs accumulate seriously due to the absence of surfactant. (c) The histograms of particle size distribution in (b), indicating average size of 7 nm. (d) TEM image of Ag NWs, inset is the selected area electron diffraction, indicating its twin crystal structure.



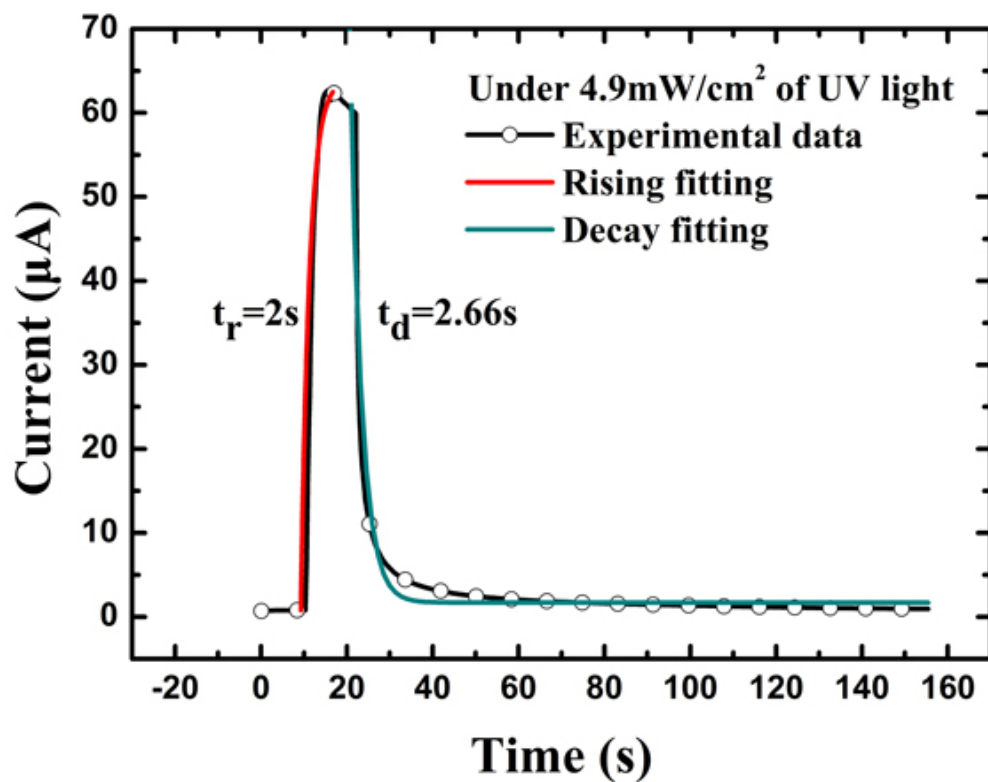
**Figure S3.** Optical microphotographs of ZnO/AgNWs/ZnO composite UV photodetector with Au electrode. From (c), we can see bright Ag NWs conductive network clearly. The longest length of Ag NWs can reach 120  $\mu\text{m}$ . The appeared colors are caused by the scattering visible light on surface of ZnO NPs layer.



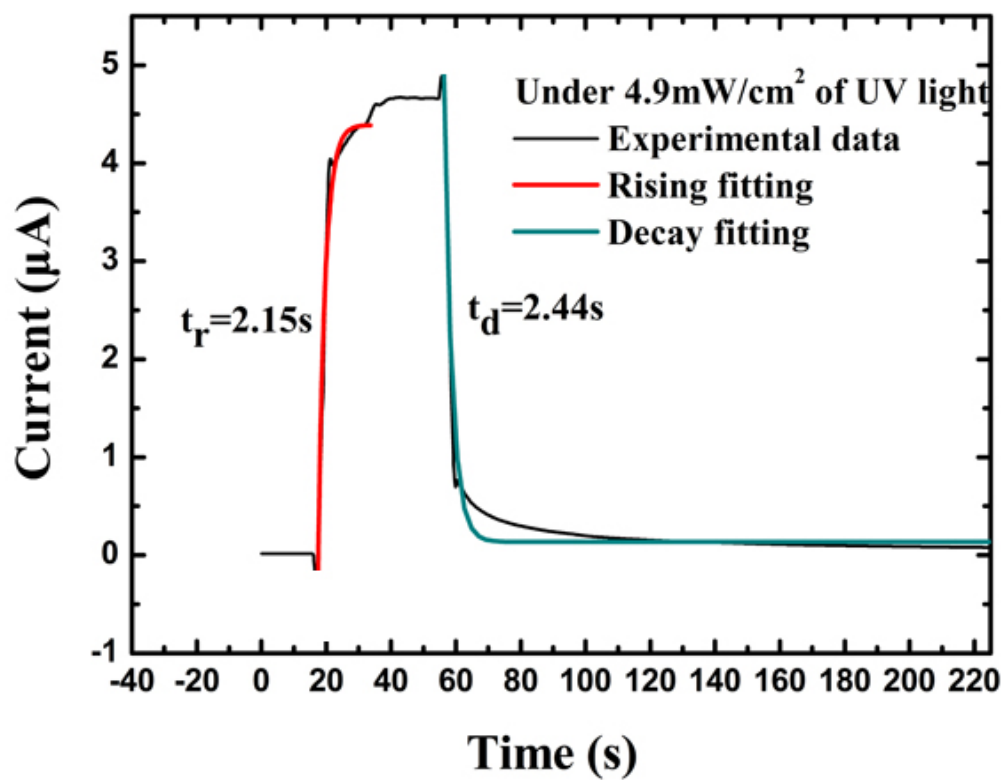
**Figure S4.** Time-dependent photoresponse of bottom ZnO/upper ZnO UV photodetector at 1 V applied bias under  $10\mu\text{W}/\text{cm}^2$  of UV light.



**Figure S5.** Optical microphotographs of ZnO/AgNWs/ZnO composite UV photodetectors with different AgNWs densities. These different AgNWs densities were produced under different spin speeds: (a) 1000 rpm; (b) 2000 rpm; (c) 3000 rpm.



**Figure S6.** Time-dependent photoresponse of ZnO/AgNWs/ZnO composite UV photodetector with Al electrodes at 1 V applied bias under the  $4.9\text{mW/cm}^2$  of UV light illumination.



**Figure S7.** Time-dependent photoresponse of ZnO/AgNWs/ZnO composite UV photodetector with Au electrodes at 1 V applied bias under the 4.9mW/cm<sup>2</sup> of UV light illumination.