Supporting Information for

Photo-directed growth of Au nanowires on ZnO arrays for enhancing photoelectrochemical performances

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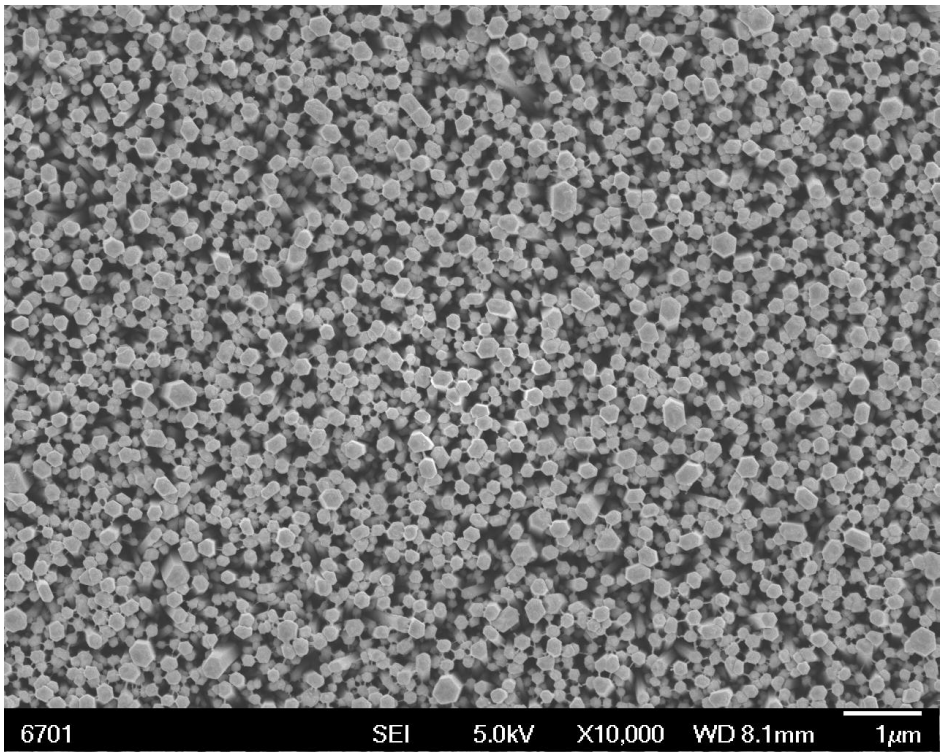

Figure S1 Top-view SEM image of cross-linked Au/ZnO nanowire arrays

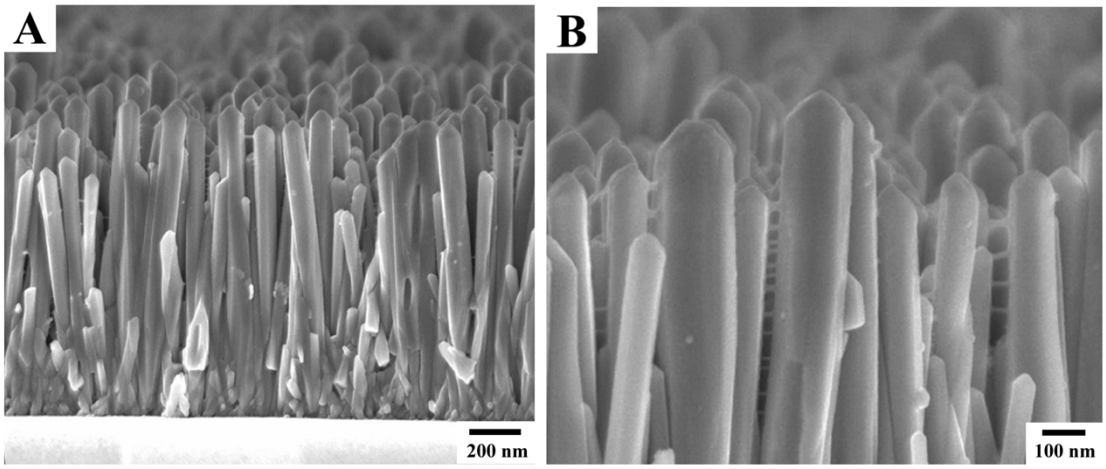

Figure S2 (A,B) cross-sectional SEM image of cross-linked Au/ZnO nanowire array.

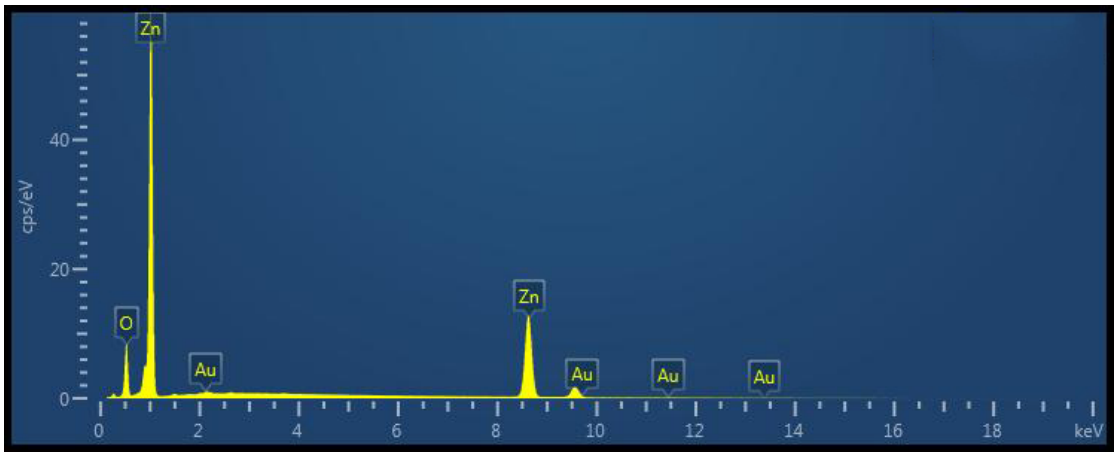

Figure S3 EDS of the Au/ZnO heterostructures

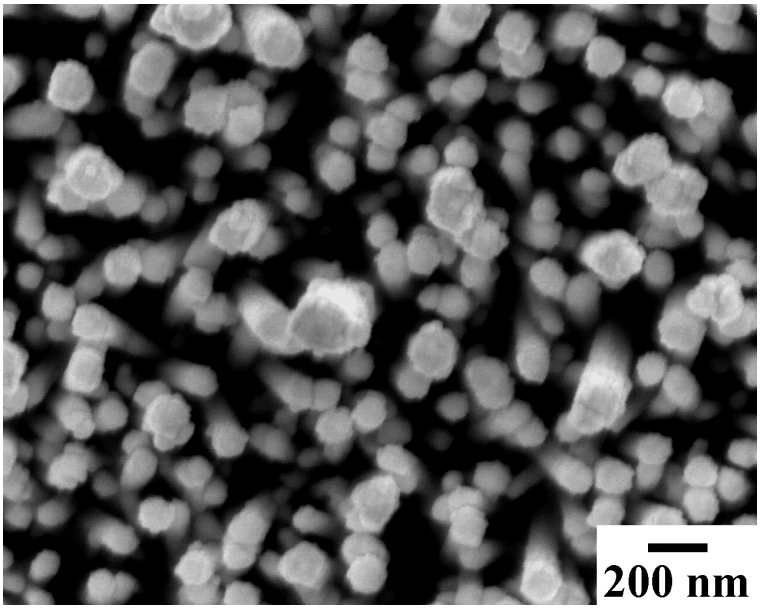

Figure S4 SEM image of Au/ZnO nanowire arrays reacted in 0.4 mM $HAuCl_4$, 0.1 M Na_3PO_4 and 0.05 M PVP aqueous solution.

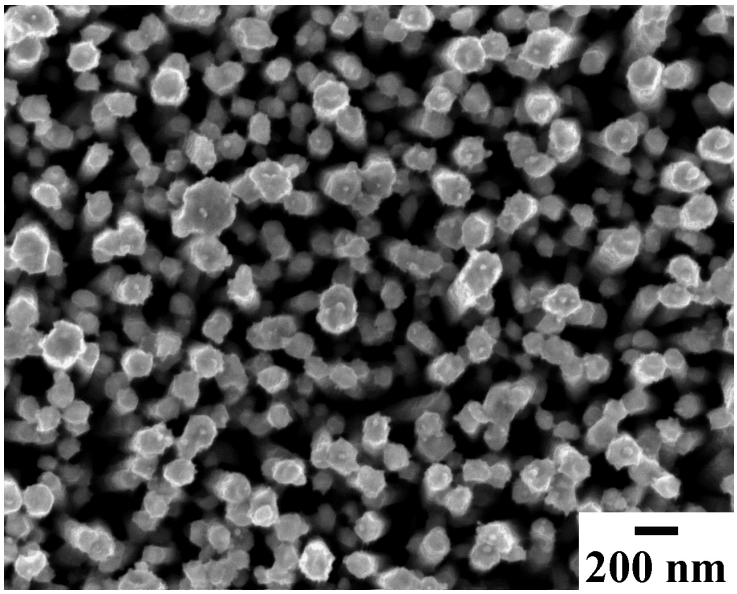

Figure S5 SEM image of Au/ZnO nanowire arrays reacted in 0.4 mM $HAuCl_4$, 0.1 M Na_3PO_4 and 0.15 M PVP aqueous solution.

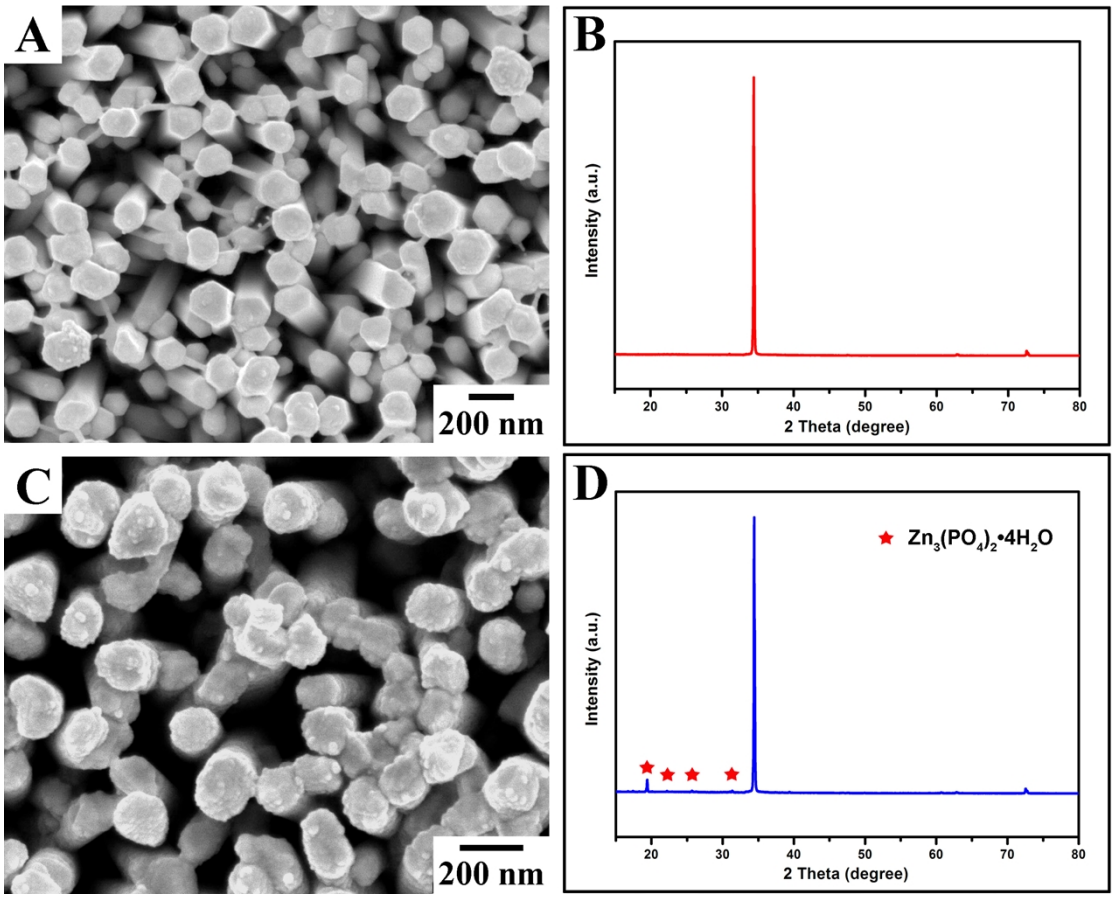

Figure S6 SEM image and XRD pattern of Au/ZnO nanowire arrays reacted in 0.4 mM $HAuCl_4$, 0.3 M PVP, and 0.1 M Na_2HPO_4 (A, B)/NaH_2PO_4 (C, D) aqueous solution.

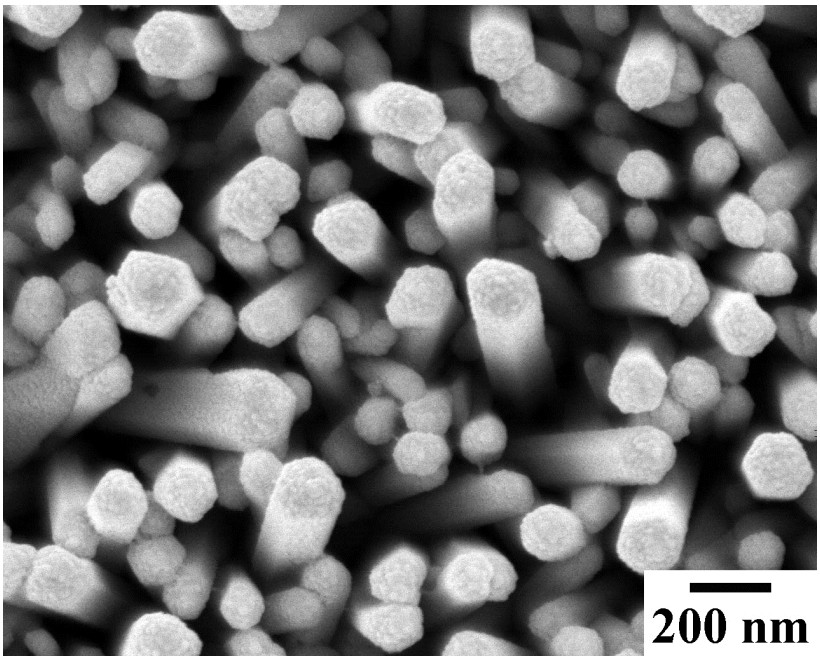

Figure S7 SEM image of Pt/ZnO nanowire arrays reacted in 0.4 mM H_2PtCl_6, 0.1 M Na_3PO_4 and 0.3 M PVP aqueous solution.

Results and discussions

ZnO nanowire arrays could also been connected with other metallic nanowires. As shown in Fig. S7, when $HAuCl_4$ was replaced by H_2PtCl_6 in the same reaction system, a few number of ultra-fine Pt nanowires could also be formed on the ZnO nanowires, indicating that this strategy may serve as general method for growing metal nanowires.

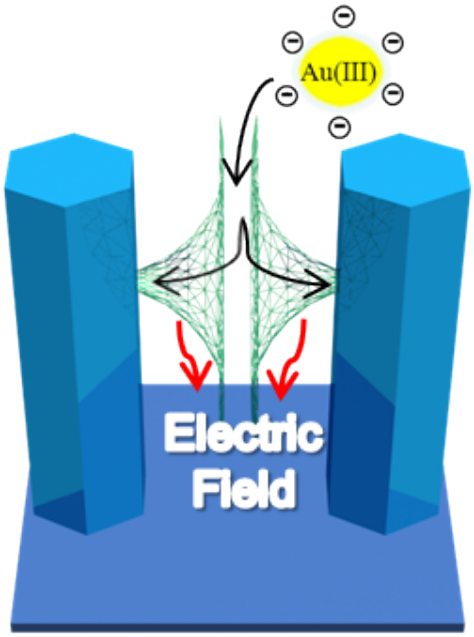

Figure S8 The formed electric field between two ZnO nanowires.

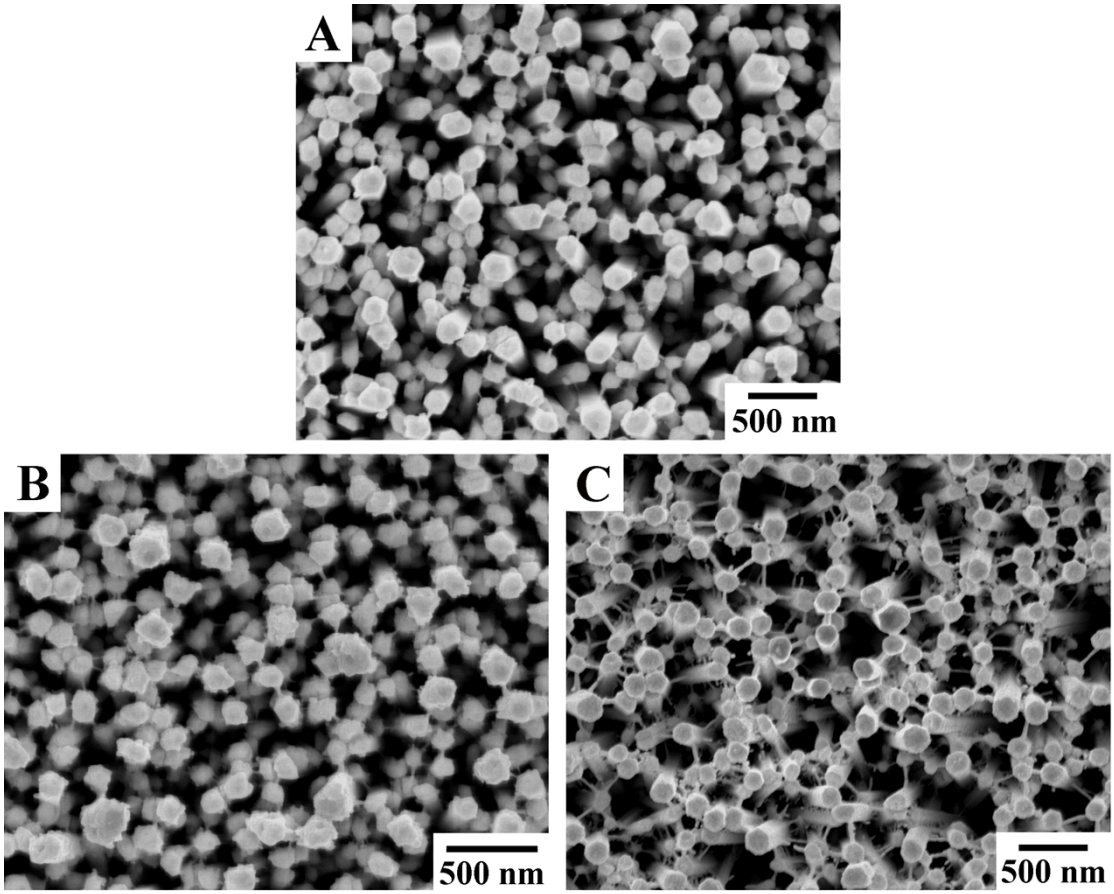

Figure S9 SEM images of cross-linked Au/ZnO nanowire arrays with different Au deposition (0.4 mM (A), 0.8 mM (B), 1.2 mM (C) $HAuCl_4$ was used in the reaction, respectively).

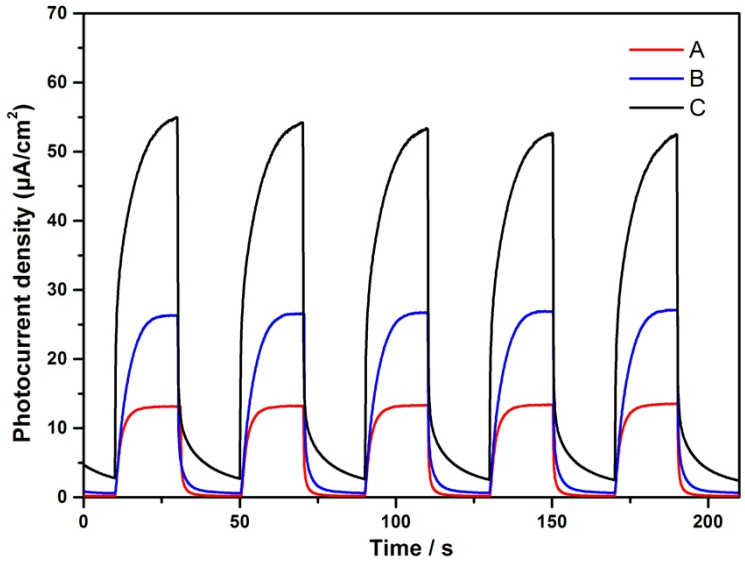

Figure S10 Amperometric I–t curves of the cross-linked Au/ZnO nanowire arrays with different Au deposition (0.4 mM (A), 0.8 mM (B), 1.2 mM (C) $HAuCl_4$ was used in the reaction, respectively) at an applied voltage of +0.2V with 20 s light on/off cycles under visible light irradiation.

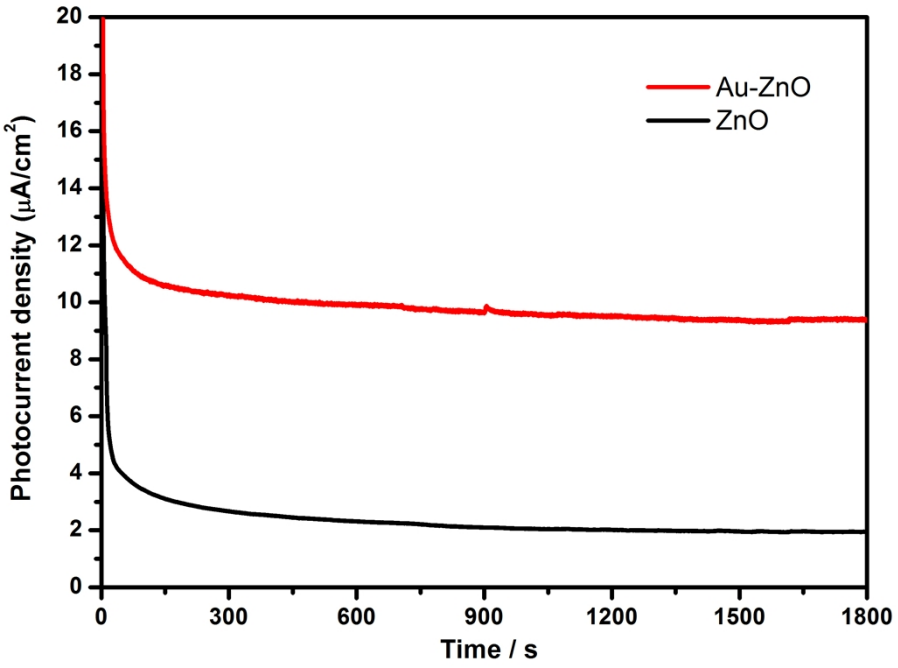

Figure S11 Working lifetime of Au/ZnO nanowire arrays and bare ZnO nanowire arrays under continuous visible light illumination.

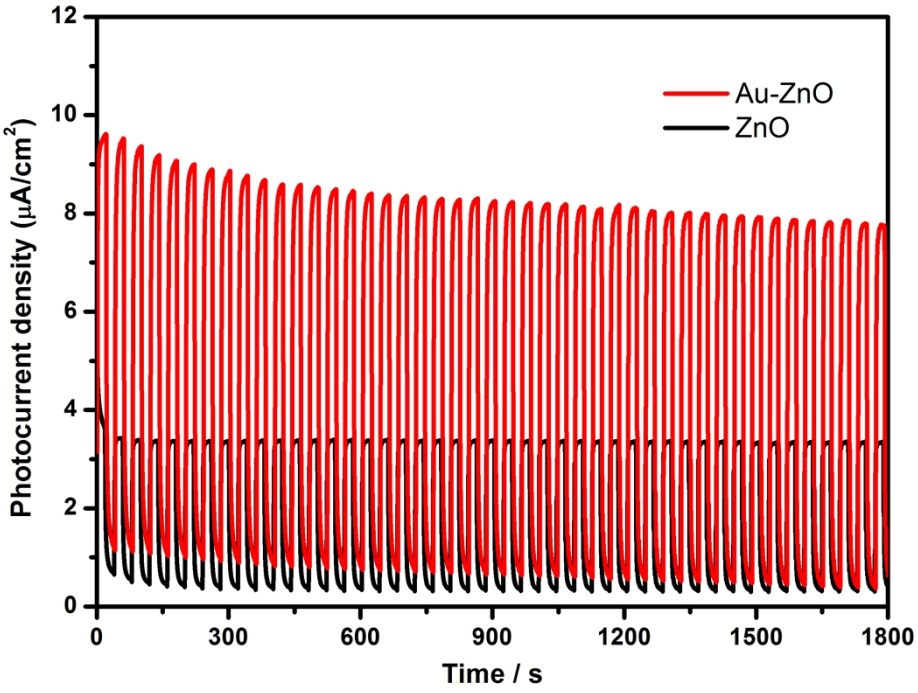

Figure S12 Working lifetime of Au/ZnO nanowire arrays and bare ZnO nanowire arrays under chopped visible light illumination.