Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

Remarkable Cd-free Sb_2Se_3 solar cell yield by interface band-alignment and growth orientation screening

Weihuang Wang[1], Zixiu Cao[1], Huanhuan Wang[1], Jingshan Luo[1,], Yi Zhang[1,*]*

[1] Institute of Photoelectronic Thin Film Devices and Technology and Tianjin Key Laboratory of Thin Film Devices and Technology, Nankai University, Tianjin 300350, China

*Corresponding author, Email: yizhang@nankai.edu.cn; jingshan.luo@nankai.edu.cn

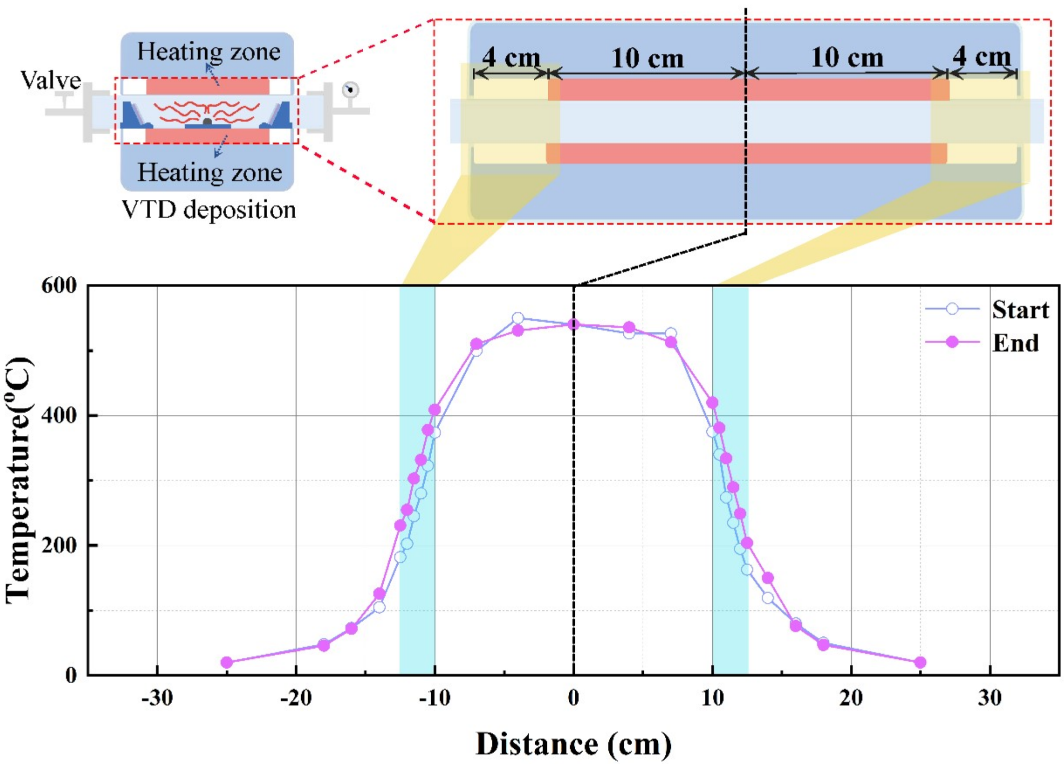

Figure S1. The detected temperature distribution of the tube furnace at 540 °C without casing cap.

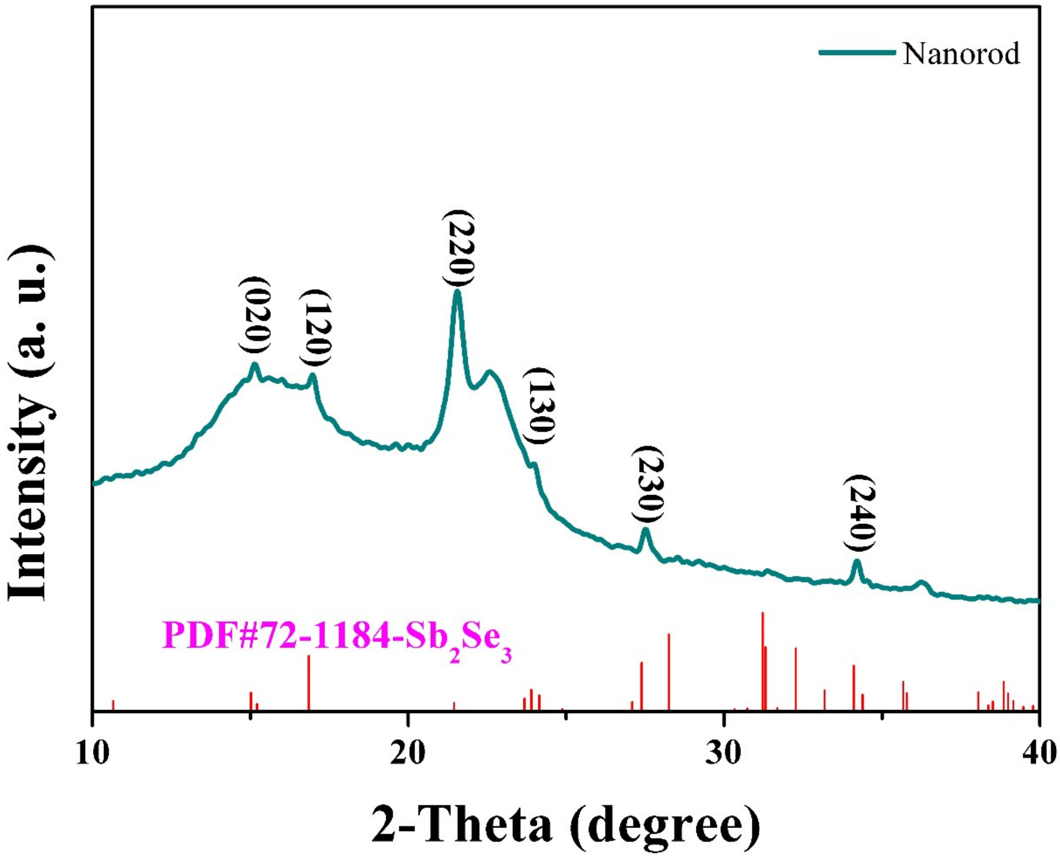

Figure S2. XRD diffraction pattern of the plastic film which is used to remove the Sb_2Se_3 nanorods and nanosheets from the Sb_2Se_3 thin film based on sample TiO_2-W/O.

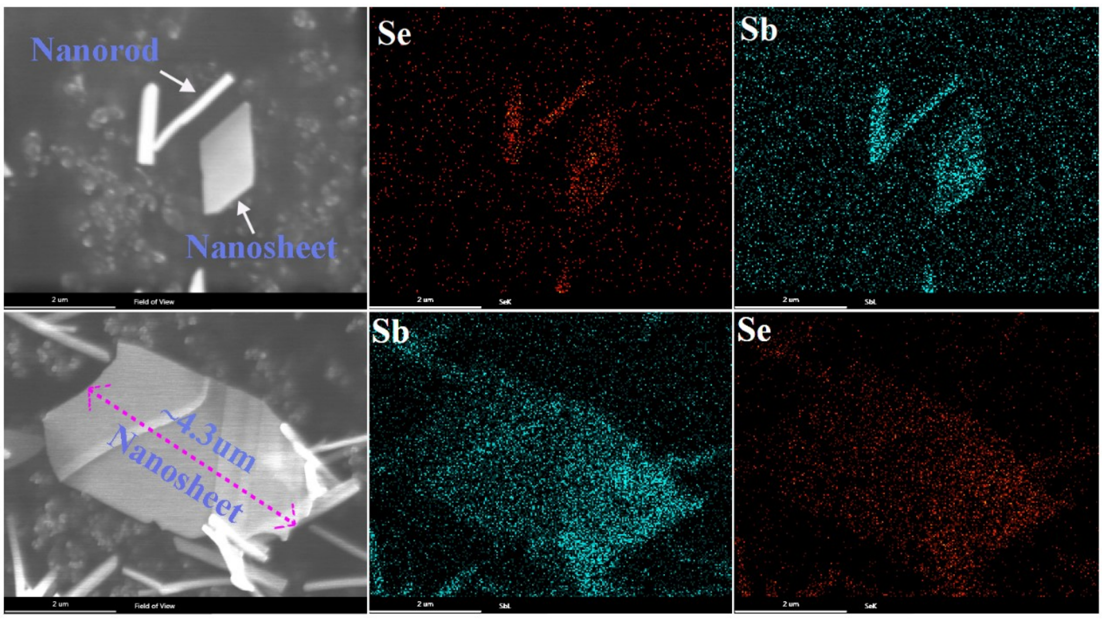

Figure S3. The EDS mapping of the Sb_2Se_3 nanorods and nanosheets.

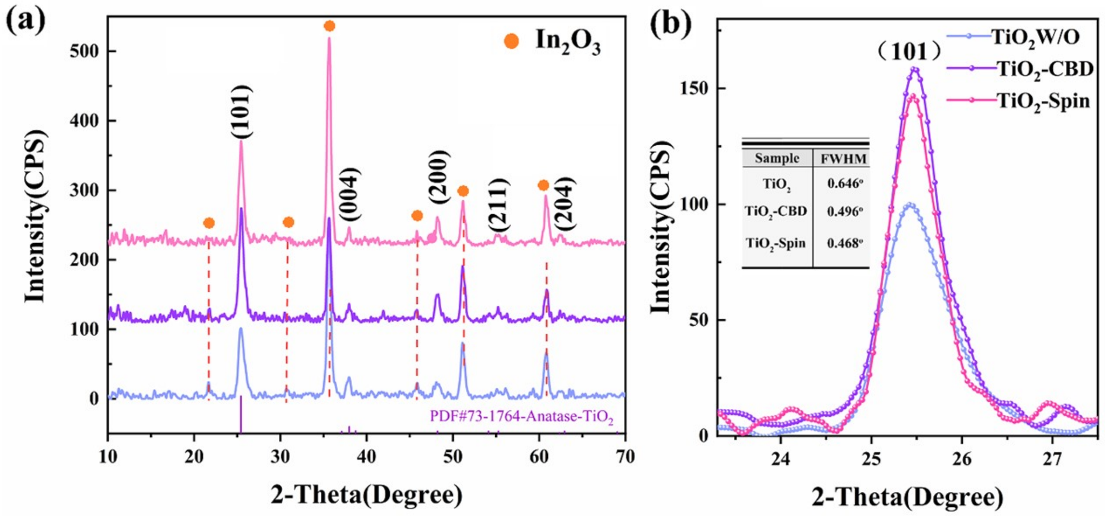

Figure S4. XRD diffraction pattern of samples TiO_2-W/O, TiO_2-CBD and TiO_2-Spin. (b) The enlarged view of the diffraction peak of (101) plane.

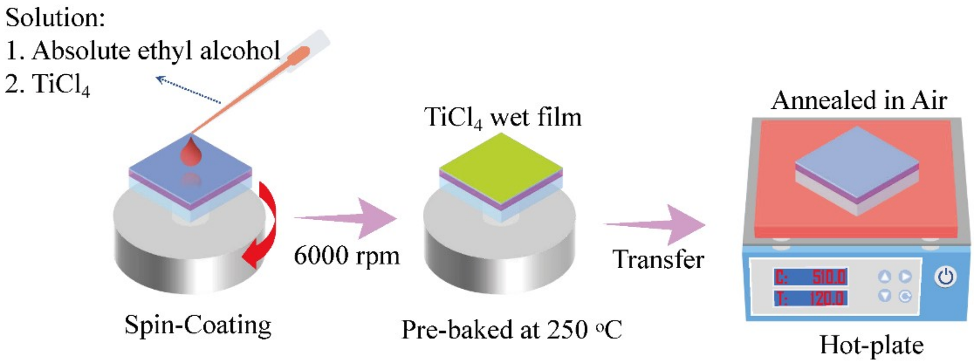

Figure S5. The schematic diagram of the $TiCl_4$ treatment process by spin-coating.

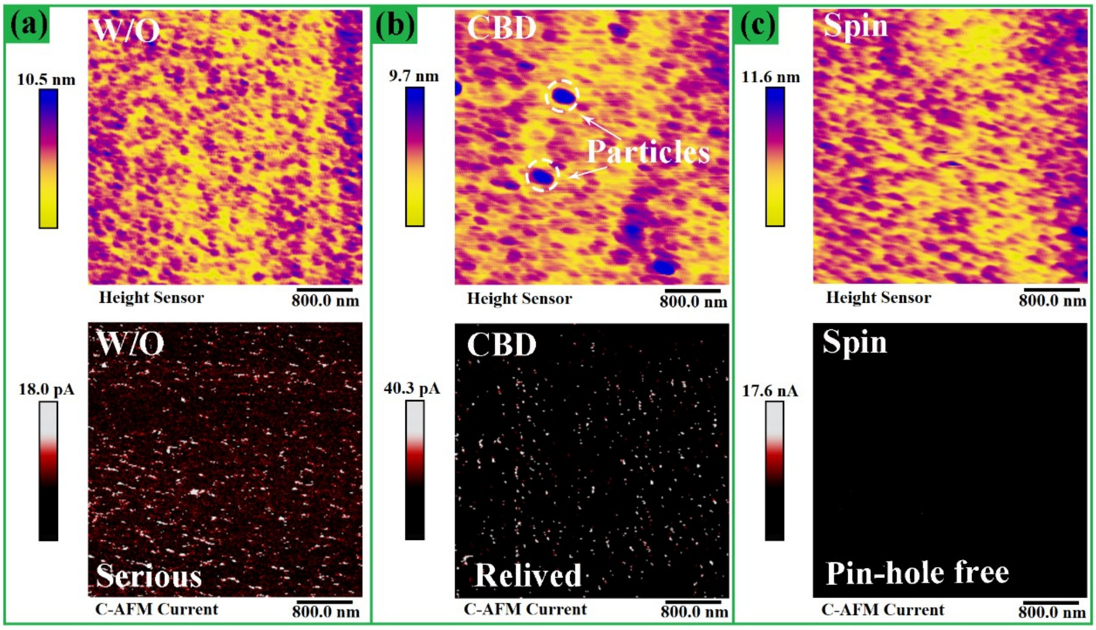

Figure S6. The AFM scanning image and the tunneling current distribution of samples (a) TiO_2-W/O, (b) TiO_2-CBD and (c) TiO_2-Spin.

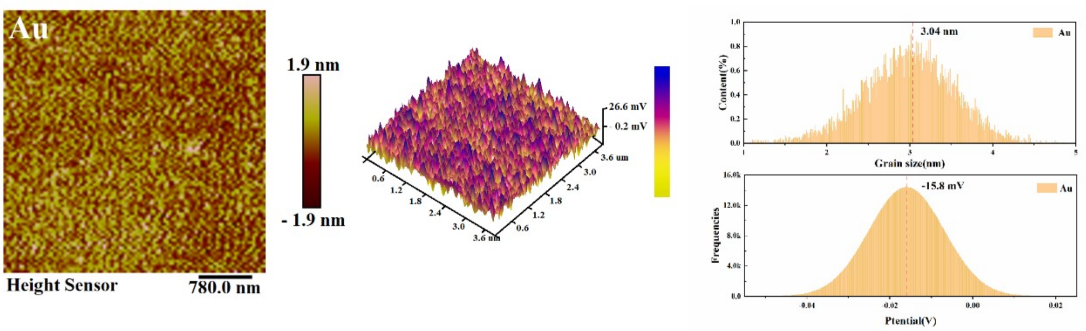

Figure S7. AFM image and the discrete frequency chart of frequencies versus potential of Au film.

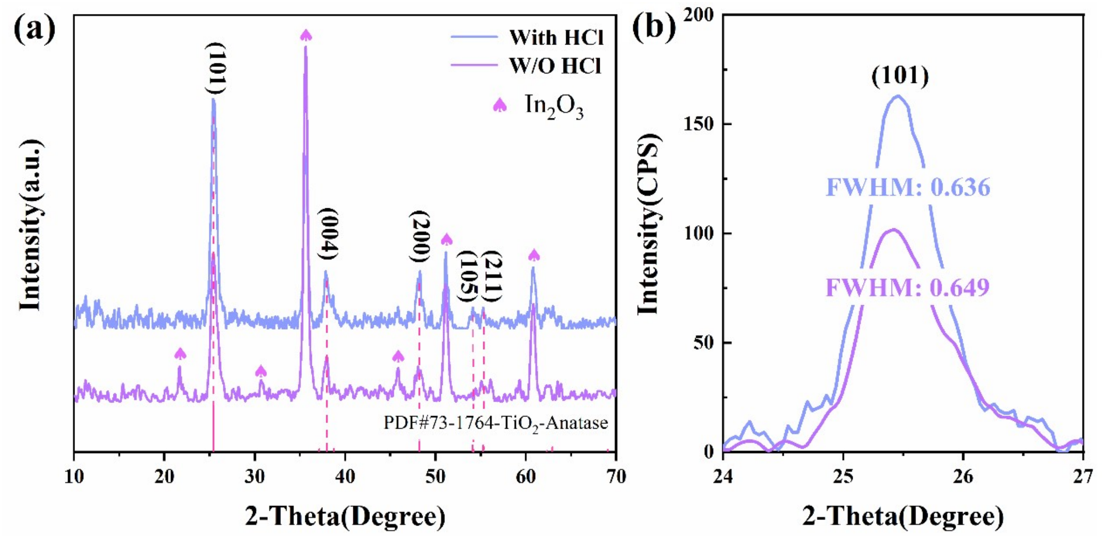

Figure S8. (a) XRD diffraction patterns of TiO_2 thin film with and without HCl addition. (b) The enlarged view of the diffraction peak of (101) plane.

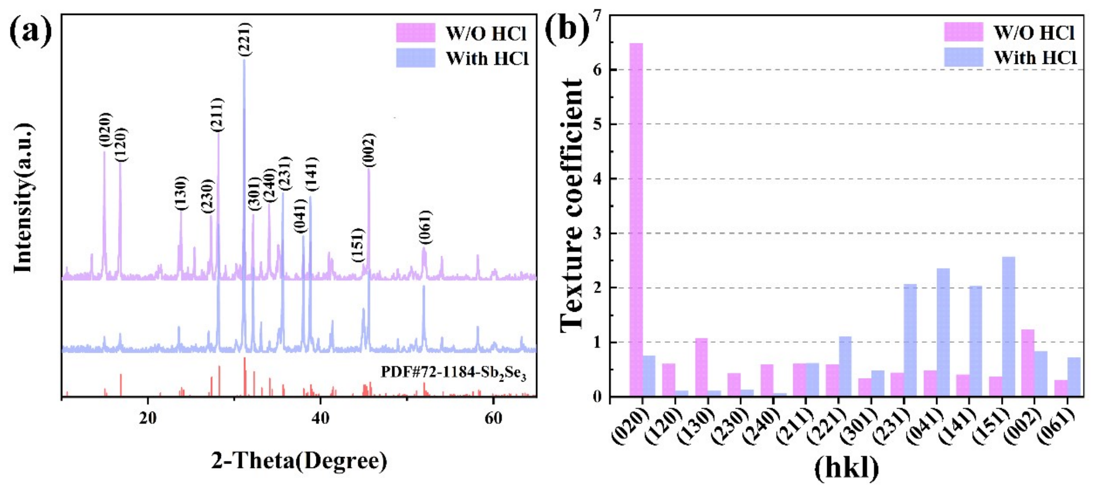

Figure S9. XRD diffraction patterns and (b) texture coefficients of the diffraction peaks of Sb_2Se_3 thin films deposited on TiO_2 thin film with and without HCl addition.

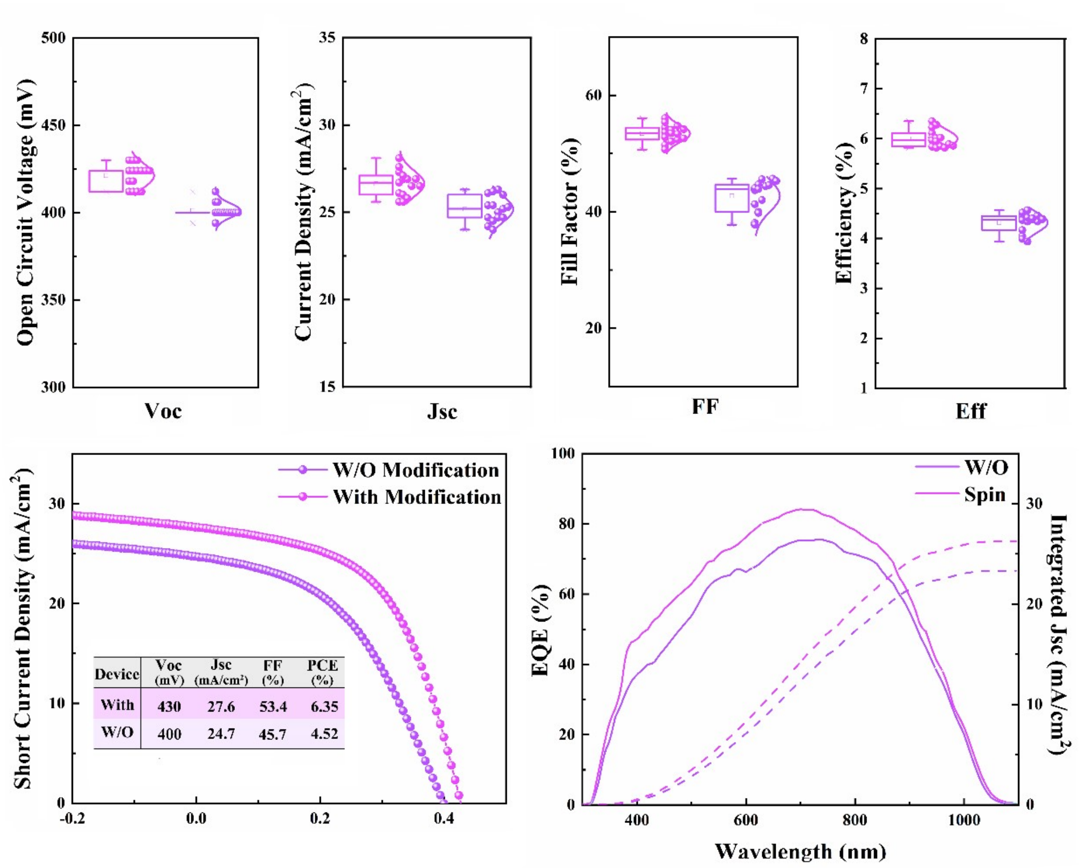

Figure S10. (a) The performance of Sb_2Se_3 solar cell with TiO_2-Spin/CdS double ETL structure.

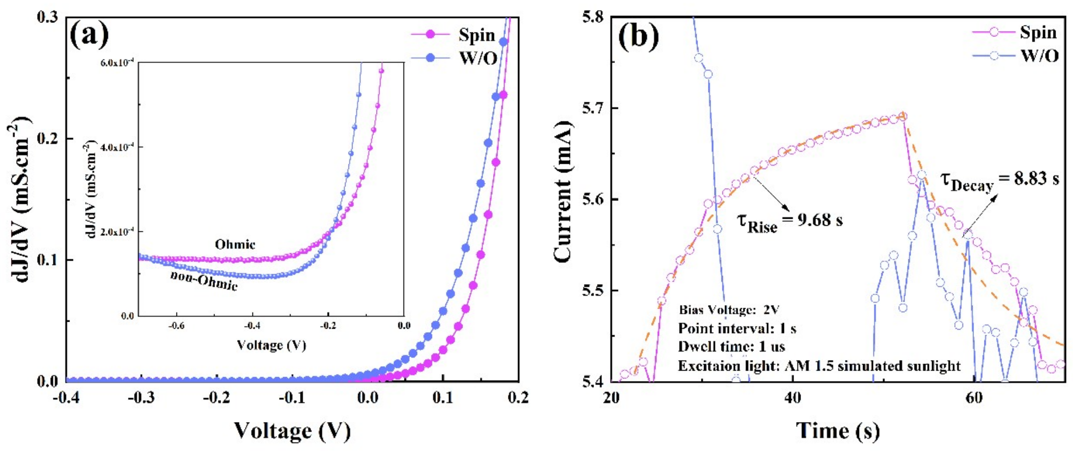

Figure S11. (a) The dJ/dV-V curves of Sb_2Se_3 solar cells and single-cycle on-off curves of the photoelectric detectors.

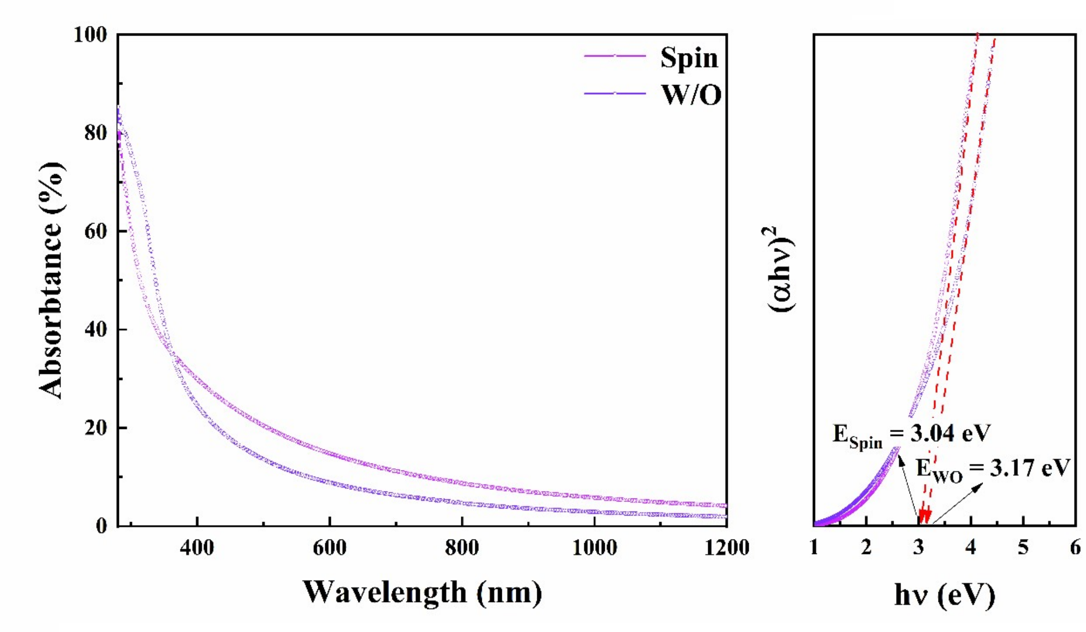

Figure S12. (a) The absorption spectrum and the extracted $(\alpha h\nu)^2$- hν plots of samples TiO_2-W/O and TiO_2-Spin.