Electronic Supplementary Information (ESI)

A study of wide bandgap oxides by their optical properties for transparent photovoltaics platform†

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Table S1 Summary of tristimulus values and color coordinates of the TPV devices.

Device	Tri-stimulus values			color coordinates	
	X	Y	Z	x	y
ZnO-TPV	62.10	61.87	48.29	0.360	0.359
Rutile-TPV	55.68	55.27	42.12	0.364	0.361
Anatase-TPV	59.35	59.01	45.43	0.362	0.360

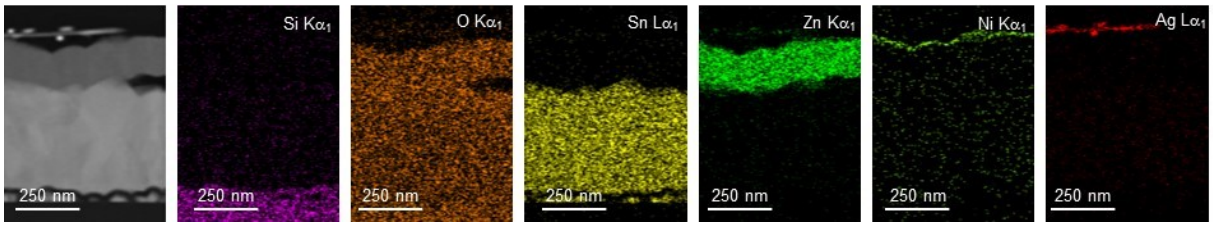

Fig. S1 Elemental distribution of the ZnO-TPV device. A high-resolution transmission electron microscope image of the ZnO-TPV device with the AgNWs-ZnO top electrode. The corresponding elemental mapping images for Si, O, Sn, Zn, Ni, and Ag confirm the distribution of the elements. These structural and chemical characterizations were performed using a thermal field-emission transmission electron microscope (TALOS F200X, FEI) with energy-dispersive X-ray spectrometry.

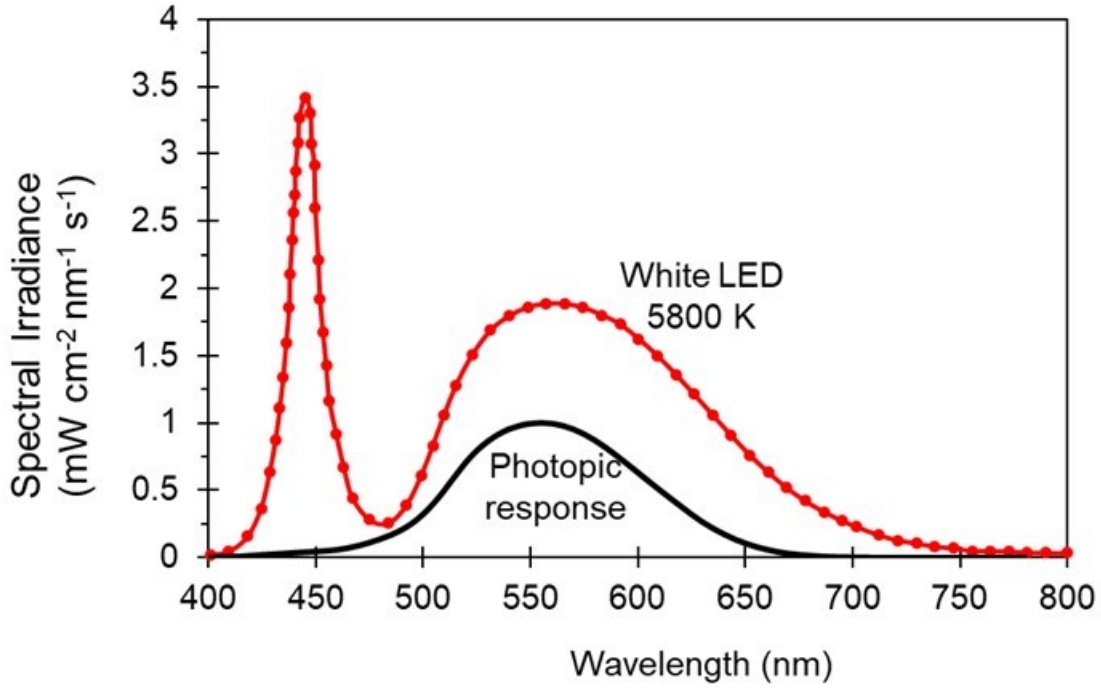

Fig. S2 Spectral irradiance of the indoor white LED of 5800 K and photopic response.

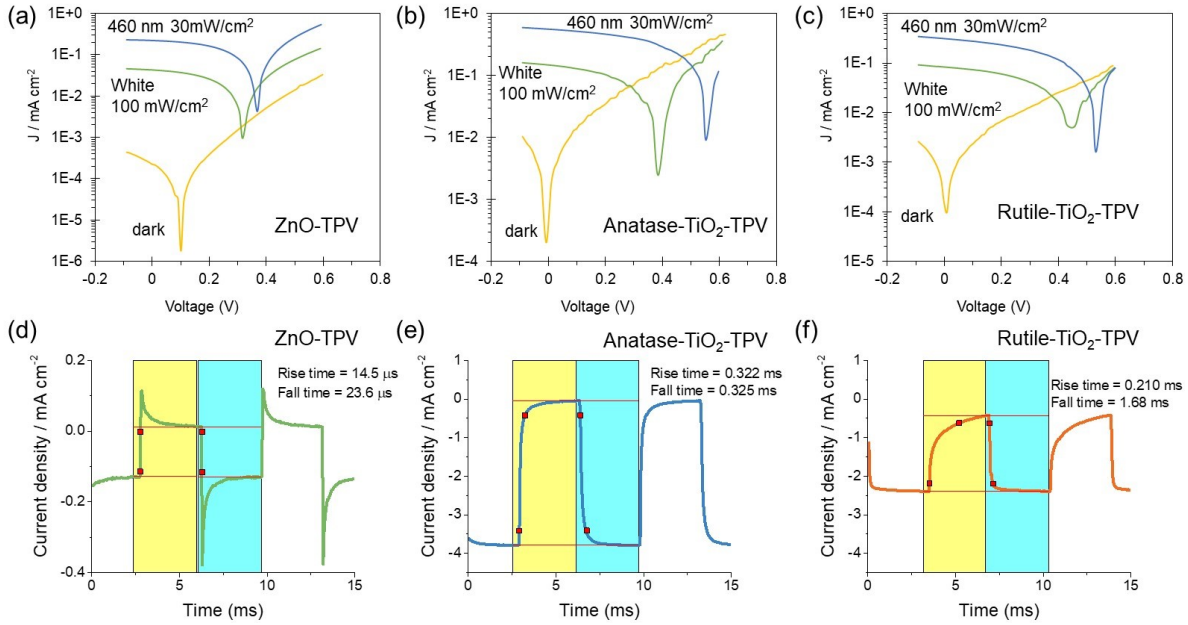

Fig. S3 TPV device performances. Semi-log-scale J-V characteristic plots of the TPV device with (a) ZnO, (b) anatase-TiO_2, and (c) rutile-TiO_2. Photoresponse speed of the TPV device with (d) ZnO, (e) anatase-TiO_2, and (f) rutile-TiO_2. Rise and fall times were estimated using the standard function defined by the Origin tool. The yellow and cyan highlight the region corresponding to the fall and rise time, respectively.

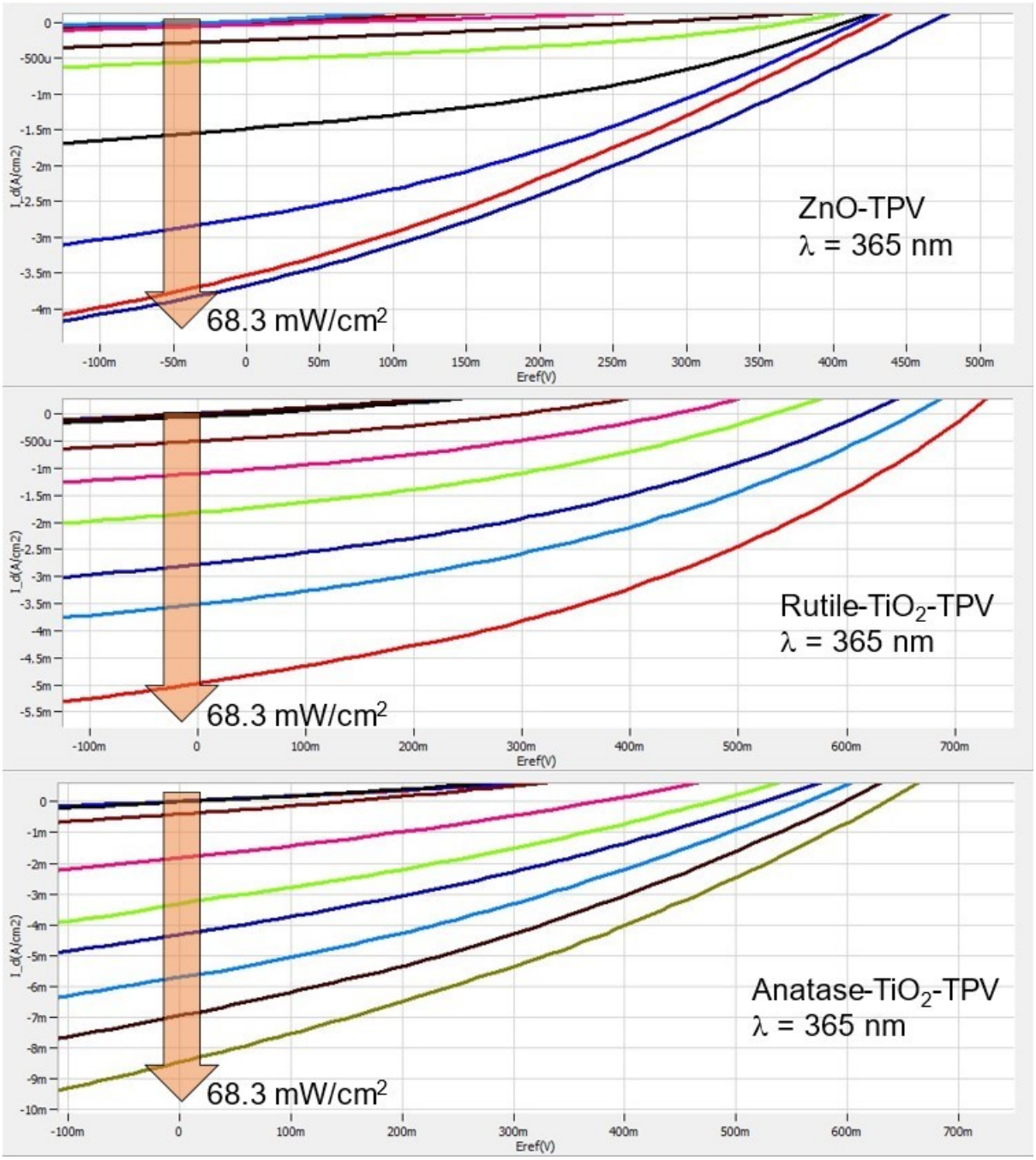

Fig. S4 Measured J-V characteristics of ZnO, rutile-TiO_2, and anatase-TiO_2 TPV device under the illumination of 365 nm wavelength. The light intensity was in the range of 0.67-68.3 mW cm^{-2}.

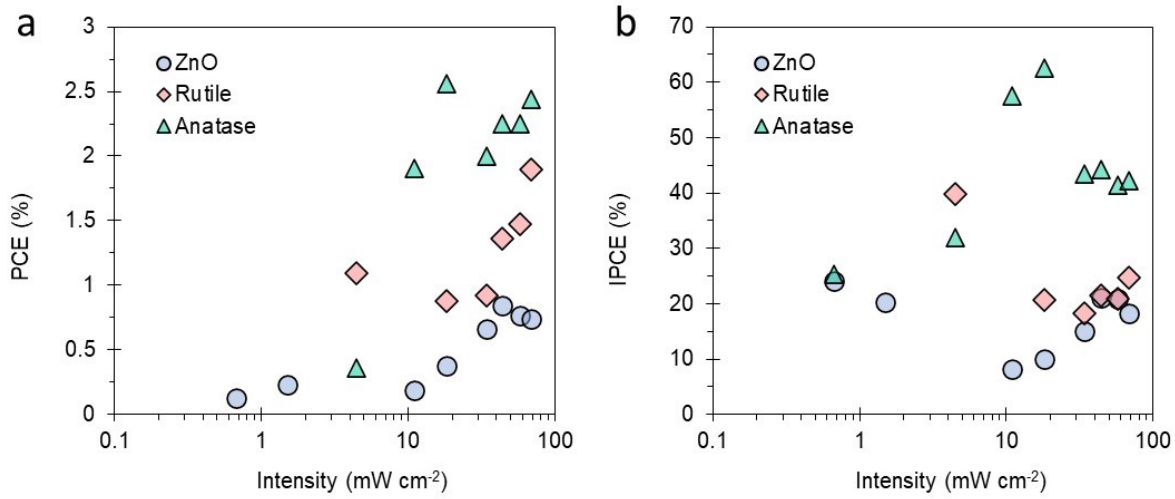

Fig. S5 Illumination intensity-dependent performance of the TPV devices. (a) Power conversion efficiency and (b) incidental photon to current conversion efficiency (IPCE) versus light intensity. IPCE can be estimated using the relation

$$IPCE = \frac{1239.8 \times J_{SC}\,(mA/cm^2) \times 100\%}{\lambda\,(nm) \times P_{h\nu}\,(mAW/cm^2)}$$

, where λ and P_{hv} is the wavelgnth of intensity of the light illumination.

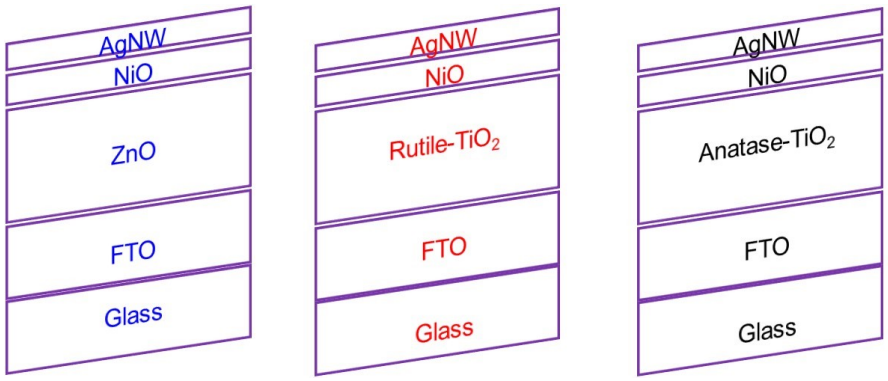

Fig. S6 TPV-device architecture employed for the Mott-Schottky analysis.