Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Defected $ZnWO_4$ decorated WO_3 nanorod arrays for efficient photoelectrochemical water splitting†

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Table S1. Lattice parameter and unit cell volume for pure WO_3 and WO_3@$ZnWO_4$ photoanodes.

		Lattice parameters						Cell volume ($Å^3$)
		a (Å)	b (Å)	c (Å)	α	β	γ	
	WO_3	7.298	7.532	7.683	90.00	90.00	90.00	422.4
WZ-1	WO_3	7.298	7.532	7.683	90.00	90.00	90.00	422.4
	$ZnWO_4$	4.686	5.713	4.931	90.00	90.60	90.00	132.0
WZ-2	WO_3	7.298	7.532	7.683	90.00	90.00	90.00	422.4
	$ZnWO_4$	4.686	5.691	4.943	90.00	90.40	90.00	131.8
WZ-3	WO_3	7.298	7.532	7.683	90.00	90.00	90.00	422.4
	$ZnWO_4$	4.686	5.689	4.954	90.00	90.50	90.00	132.1
Standard WO_3 JCPDS No. 43-1035		7.297	7.539	7.688	90.00	90.91	90.00	422.9
Standard $ZnWO_4$ JCPDS No. 15-0774		4.691	5.720	4.925	90.00	90.64	90.00	132.1

Table S2. Comparison of different WO_3 based photoanodes system used for solar water splitting recently.

Photoanode material	**Current density**	**preparation method**	**Morphology**	**References**
WO_3 nanorods /BiOI core/shell structure	0.79 mA/cm^2	hydrothermal and ionic layer adsorption reaction process.	WO_3 nanorods/BiOI nanospheres	S1
WO_3@$ZnWO_4$@ZnO-ZnO	1.57 mA/cm^2	atomic layer deposition and hydrothermal process	nanosheets	S2
$WO_3/BiVO_4$ heterojunction	0.8 mA/cm^2	solvothermal deposition; spincoating	nanorod-array films	S3
WO_3/TiO_2 photoanode	1.17 mA/cm^2	chemical bath deposition	WO_3 nanoplates/ TiO_2 nanoprickle overlayers	S4
WO_3/g-C_3N_4 heterojunction	0.73 mA/cm^2	hydrothermal growth and deposition-annealing process	nanosheet arrays	S5
WO_3@defected $ZnWO_4$	1.87 mA/cm^2	solvothermal method	nanorod arrays	**This work**

Table S3. Fitted values of R_s, R_{ct} for pure WO_3 and WO_3@$ZnWO_4$ under dark and AM 1.5 G simulated sunlight irradiation.

Device	R_s (Ω)	R_{ct} (Ω)
WO_3	35.88	31347
WZ-1	34.47	33858
WZ-2	31.62	34638
WZ-3	27.86	35552
WO_3 light	25.88	592
WZ-1 light	23.5	422.4
WZ-2 light	32.62	391.3
WZ-3 light	24.28	488.5

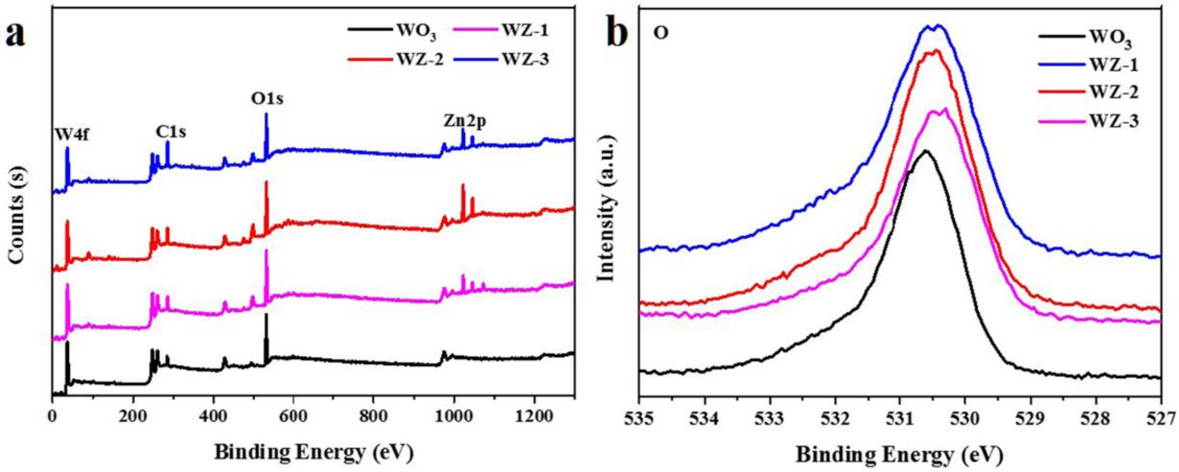

Fig. S1. The XPS spectra of WO_3 and WZ-x. (a) Survey spectra and (b) O 1s spectra.

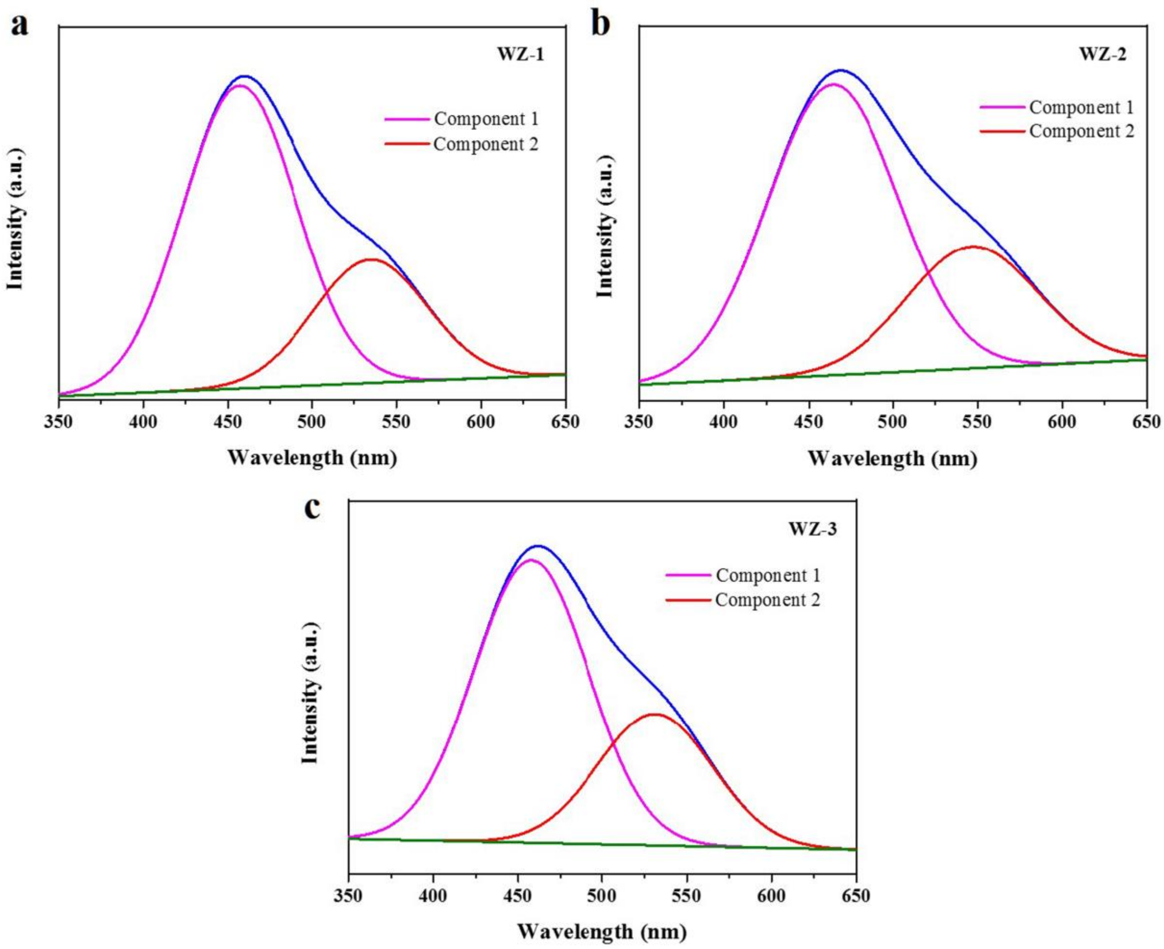

Fig. S2. Individual component, 1 (high intensity) and 2 (low intensity), of PL spectrum of WZ-x.

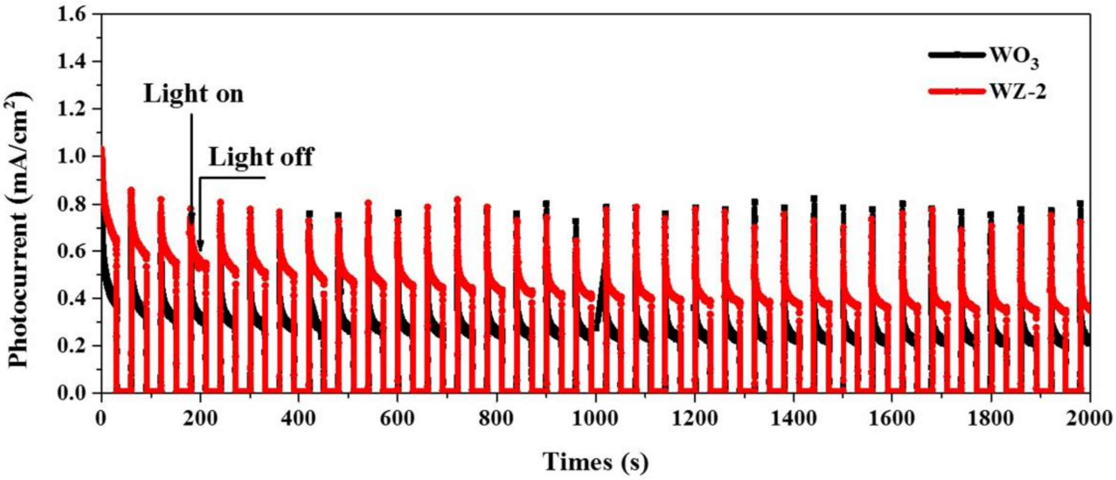

Fig. S3. PEC stability of WZ-2 under AM 1.5 G simulated sunlight irradiation at 0.4 V (*vs.* Ag/AgCl) *via* a 2000s continuous PEC water splitting experiment (60 s on-off cycle).

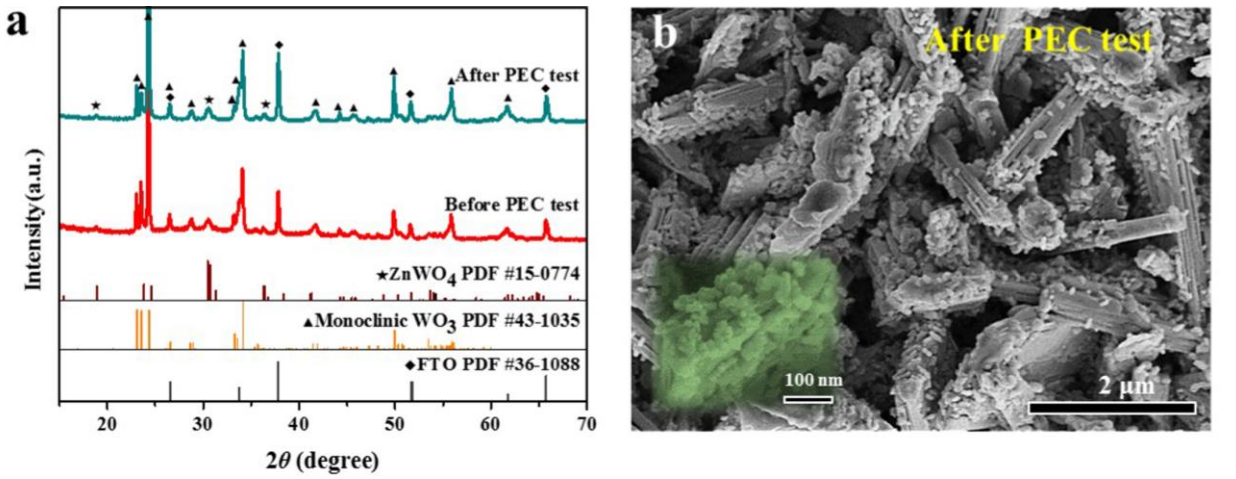

Fig. S4. (a) XRD patterns and (b) SEM images of WZ-2 before and after PEC water splitting reaction.

References:

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