# Perforated N doped monoclinic $ZnWO_4$ nanorods for efficient photocatalytic hydrogen generation and RhB degradation under natural sunlight

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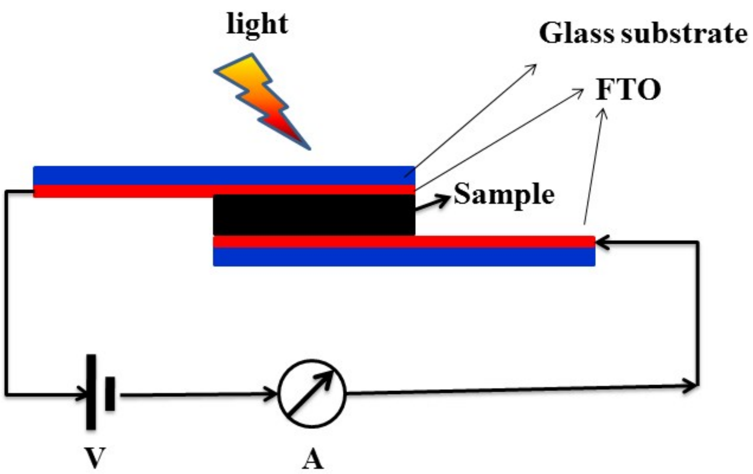
**ESI 1 Device configuration of FTO/ZW–3 ro ZW-0/FTO**




**ESI 2.** Nitrogen adsorption-desorption Study

The increase in porisity with N doping is also justified by measuring the BET surface area and pore volume. The surface area of the nanorod  increases from 9.0 to 13.61 $m^3/g$ with N substitution (see ESI 1).

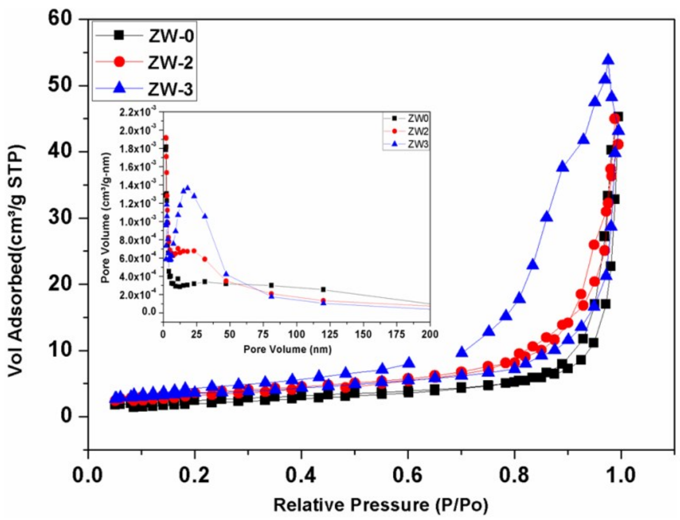
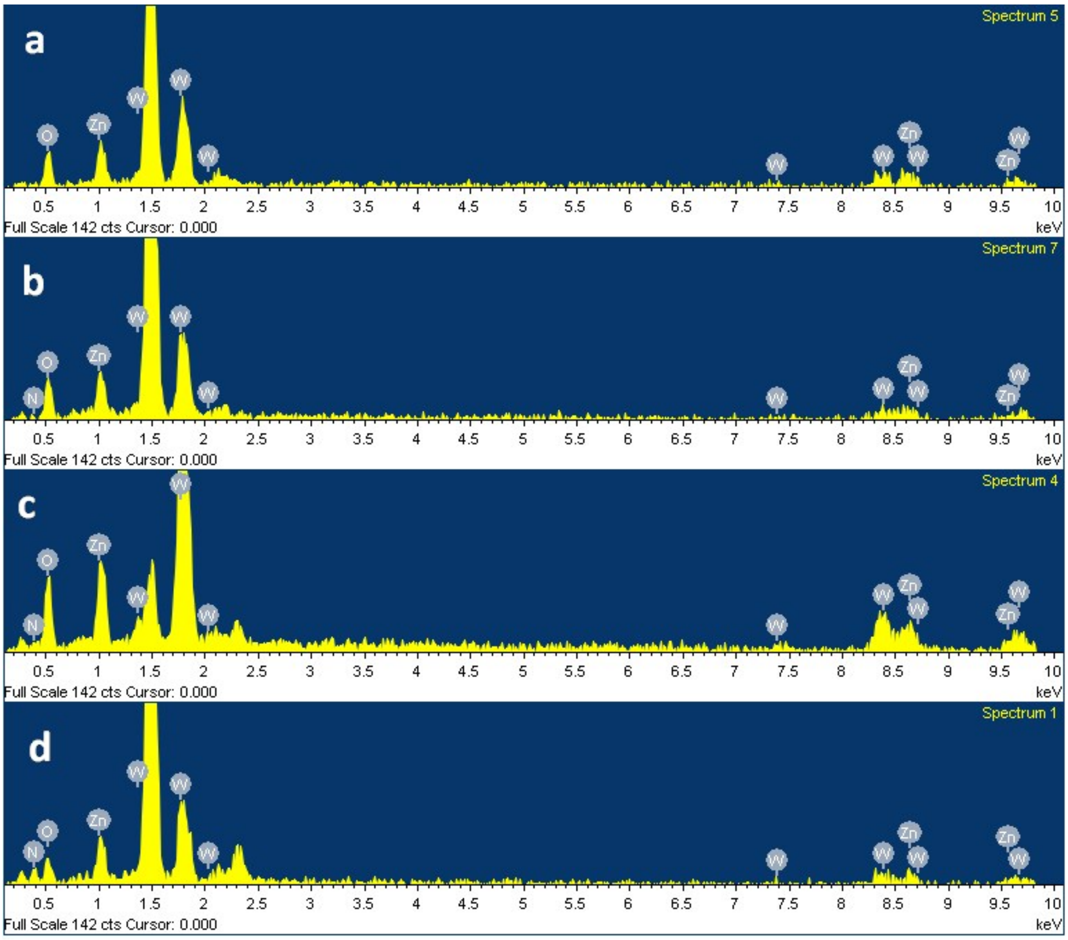



Figure ESI 2 Nitrogen adsorption-desorption isotherms obtained from samples a) ZW-0, b) ZW-2 and c) ZW-3. Inset shows corresponding pore size distributions.

**ESI 3** Table 1: Elemental analysis of ZW-0 to 3

| Samples | Elements (Wt%) | | | |
|---|---|---|---|---|
| | Zn | W | O | N |
| ZW-0 | 22.29 | 55.86 | 21.86 | 00.00 |
| ZW-1 | 13.29 | 48.07 | 37.85 | 0.79 |
| ZW-2 | 14.87 | 56.75 | 23.37 | 5.01 |
| ZW-3 | 6.53 | 51.35 | 25.53 | 16.60 |

**EDS spectra**



**ESI 4. The deconvoluted O 1s spectrum for pure $ZnWO_4$**

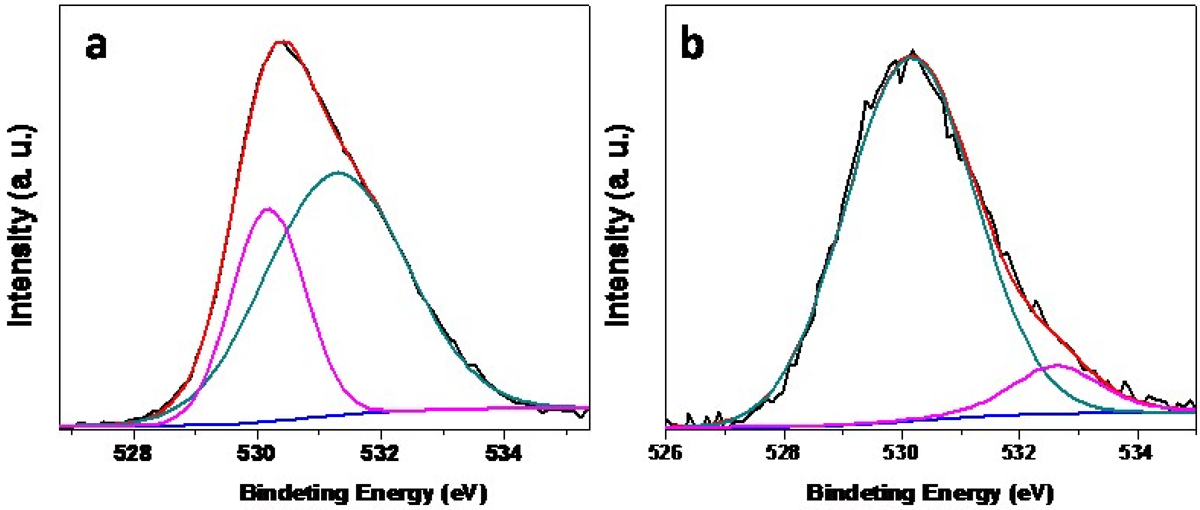



Figure ESI 4. Deconvoluted XPS spectra for O 1s of pure (a) and N doped $ZnWO_4$ (b)

**ESI 5 Reusability Study of ZW-3**

**Table 2** The $H_2$ generation rates for ZW-3 First Cycle and Second cycle.

| Sr. No. | Sample | $H_2$ evolution rate (µmol/h/g) |
|---|---|---|
| 1 | ZW–3 First Cycle | 5862.1 |
| 2 | ZW-3 Second Cycle | 5451.0 |

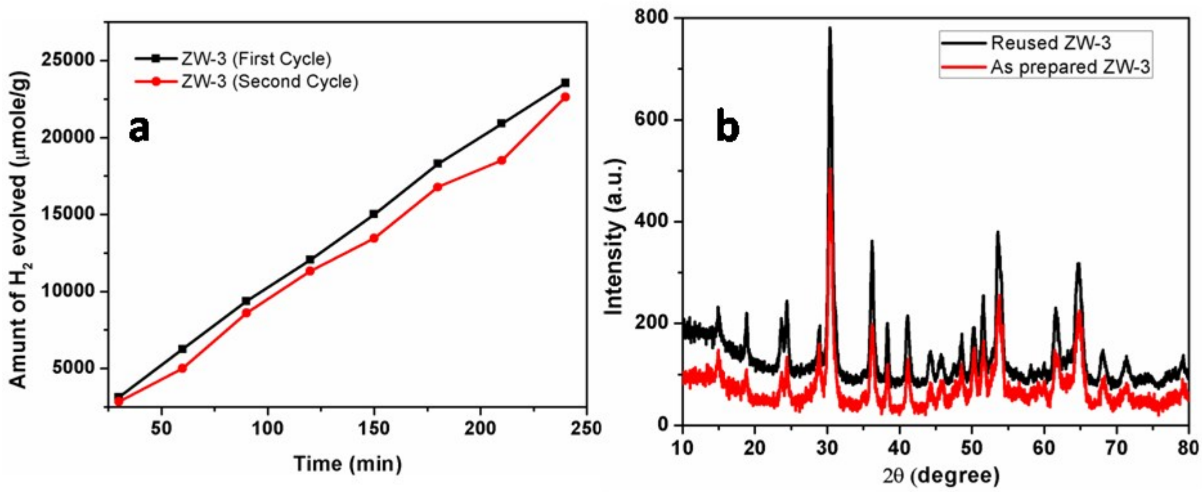



Fig ESI 5 a Photocatalytic hydrogen generation *via* $H_2O$ splitting with (a) ZW–3 (Black) and Repeatability of ZW-3(Red).Fig ESI b Xrd Pattern of as prepared ZW-3 and Reused ZW-3.

**ESI-6 The temporal evolution of the absorption spectra of RhB aqueous solution**

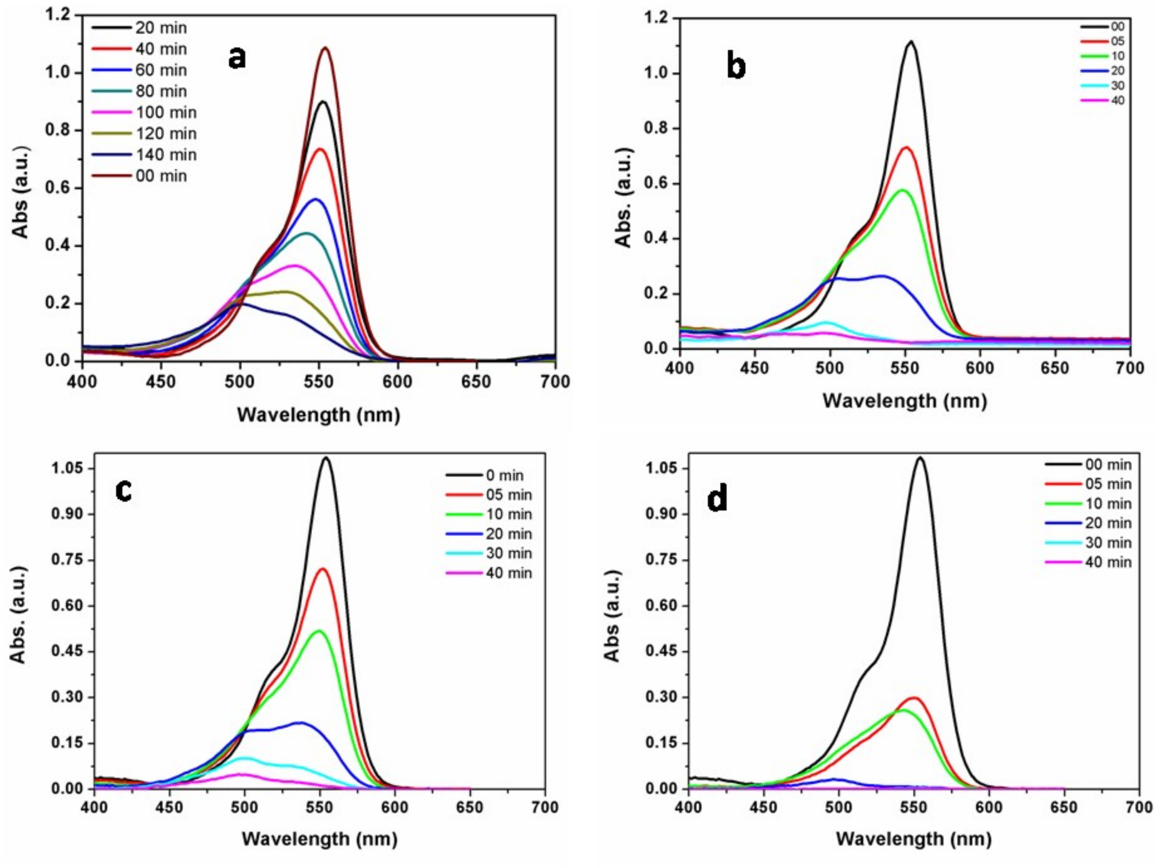



Figure ESI-6 the temporal evolution of the absorption spectra of RhB aqueous solution catalysed by the $ZnWO_4$ (a) and N-doped $ZnWO_4$ (b-c) under sun-light.