

Supporting Information

SI-1: Photoluminescence study

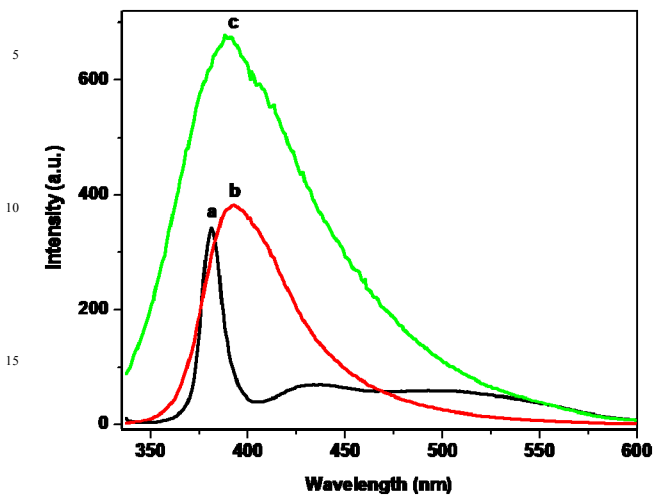


Fig. 1 PL spectra of samples (a) undoped ZnO (S1) and N-doped ZnO samples at different reaction temperature for 3h at (b) 500 °C, (c) 800 °C.

PL study shows emission peaks at 380, 393 and 389 nm for the sample S1, S2 and S5 respectively. There is a red shift
observed is due to the substitution of nitrogen in oxygen of ZnO.

SI-2: X-ray photoelectron spectroscopy for samples S3, S4 and S5

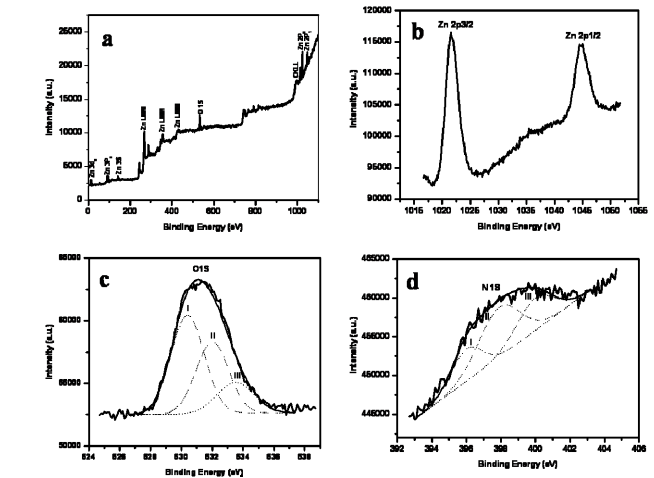


Fig. 2 XPS patterns of N-doped ZnO synthesized at 600 °C for 3 h (S3) (a) Survey spectrum and high-resolution spectra for (b) Zn2p, (c) O1s, (d) N1s.

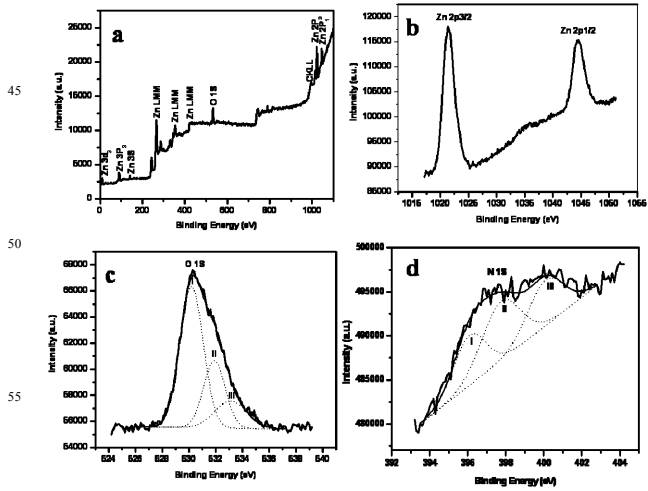


Fig. 3 XPS patterns of N-doped ZnO synthesized at 700 °C for 3 h (S4) (a) Survey spectrum and high-resolution spectra for (b) Zn2p, (c) O1s, (d) N1s.

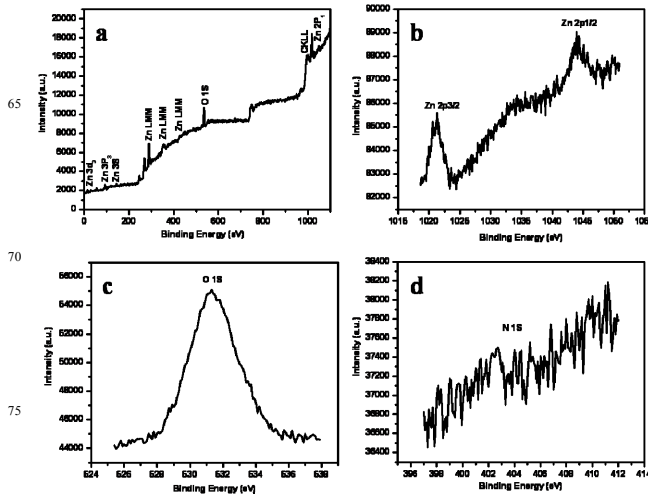


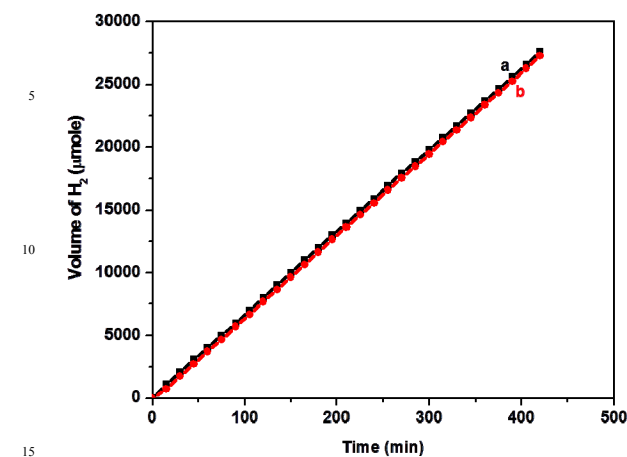
Fig. 4 XPS patterns of N-doped ZnO synthesized at 800 °C for 3 h (S5) (a) Survey spectrum and high-resolution spectra for (b) Zn2p, (c) O1s, (d) N1s.

The full XPS spectrum of N-doped ZnO (fig. 2a, 3a, 4a) showed only peaks assignable to Zn, O, C and N. From the above Fig. 2-4 it is clear that the sample S5 does not contained
the nitrogen.

SI-3: photocatalytic study of reused photocatalyst

SI-5: Xe lamp spectrum

40



15

Fig. 5 Time verses volume of H₂ (μmole) evolution of as synthesized N-doped ZnO (a) S2 and (b) reused S2.

Fig. 5 shows the hydrogen evolution rate verses irradiation time plot for the catalyst S2. For the stability purpose we reused the catalyst S2 and we obtained the hydrogen evolution rate around ~3886 μmole h⁻¹.

20

SI-4: XRD of reused photocatalyst

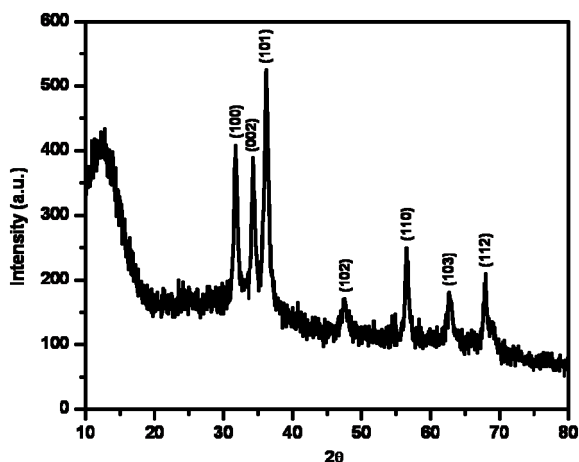
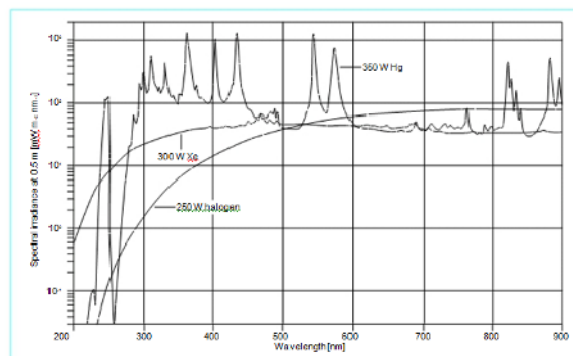


Fig. 6 XRD of sample (S2) after photocatalytic study.

Fig. 6 shows the XRD spectrum of sample (S2) after photocatalytic study. The XRD spectrum of the sample S2 (Fig. 2) shows the wurtzite structure which is well matches with the reused catalyst (S2) which did not show change in the phase purity of N-doped ZnO.

35

Lamp spectra and irradiance



45