**Figure S1** TGA-DTA curve of ZBO 2
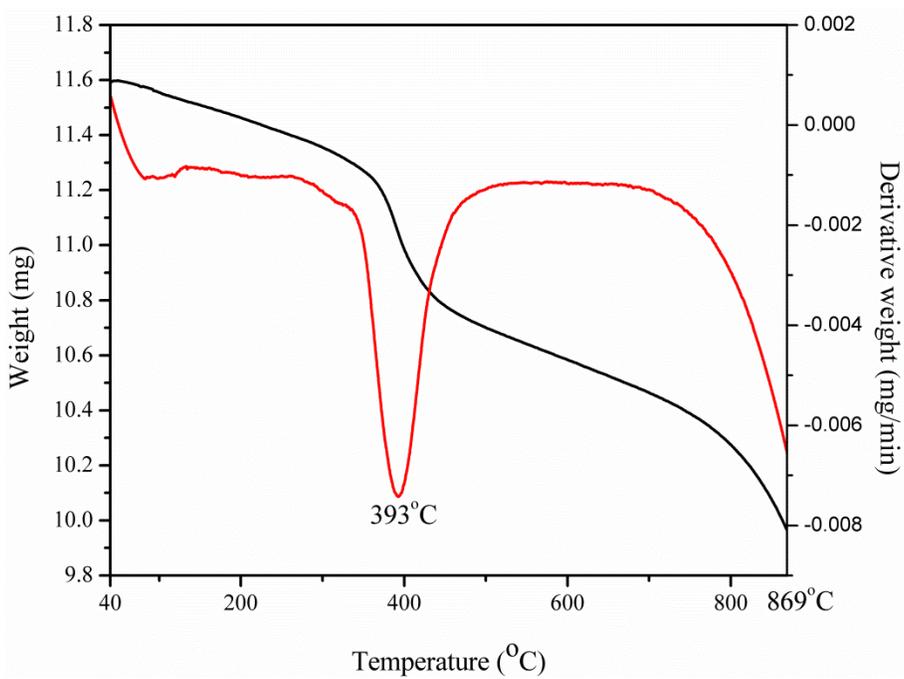


**Figure S2** TGA-DTA curve of ZBO 4
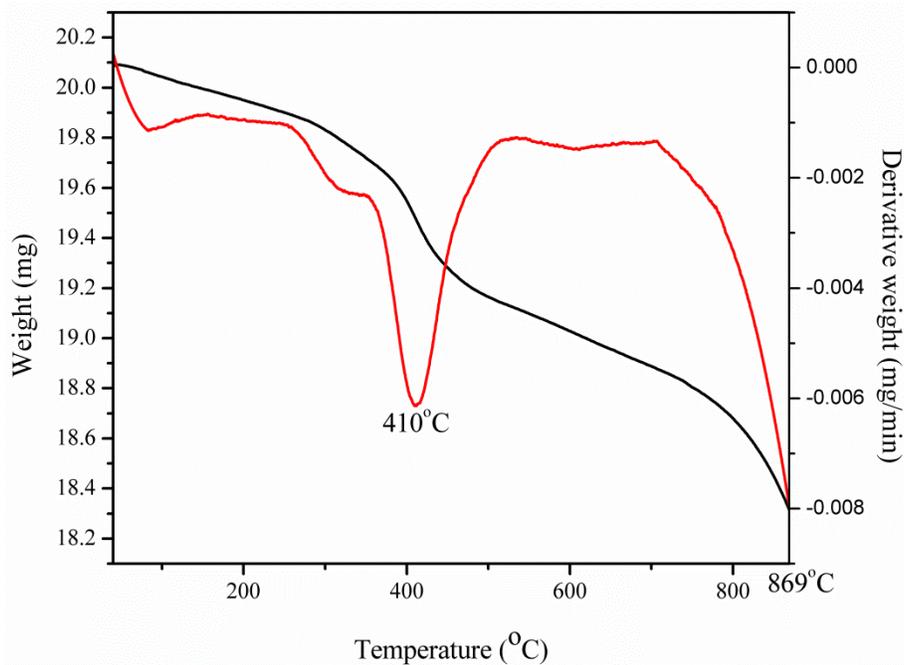
**Figure S3** TGA-DTA curve of ZBO 6
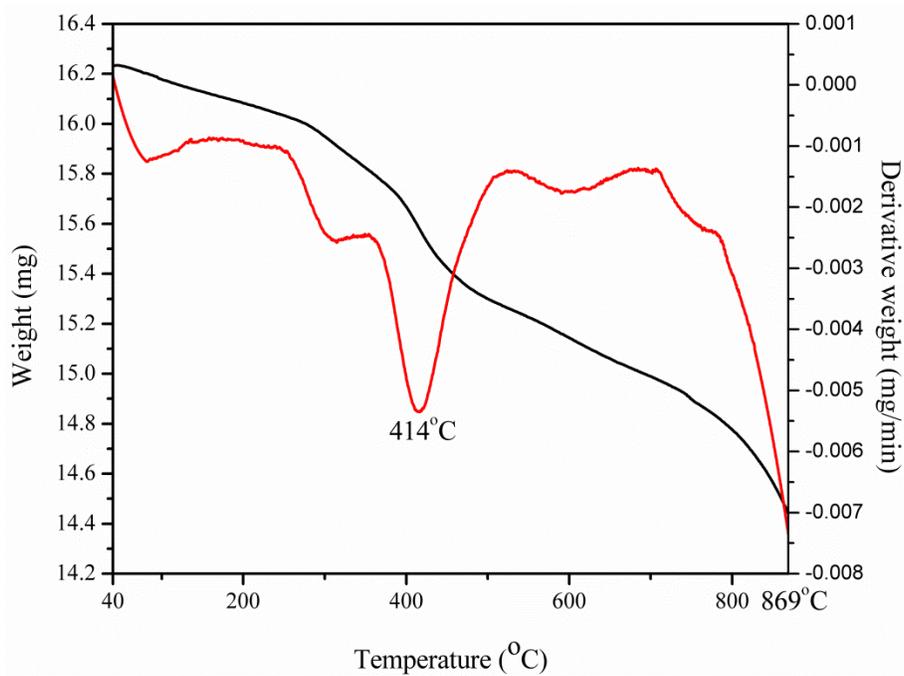


**Figure S4** TGA-DTA curve of ZBO 8

| Sample Code | FWHM (°) | Size (nm) |
|---|---|---|
| BO | 0.146 | 56.8 |
| ZBO 2 | 0.149 | 55.2 |
| ZBO 4 | 0.18 | 45.76 |
| ZBO 6 | 0.18 | 45.75 |
| ZBO 8 | 0.18 | 45.71 |

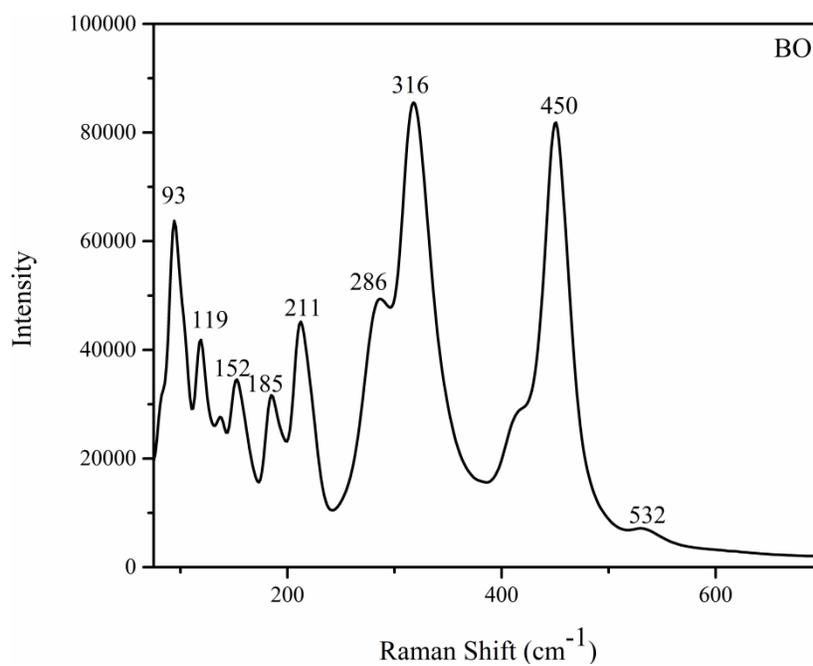Table S1: Crystallite size calculated from XRD using Scherer's formula



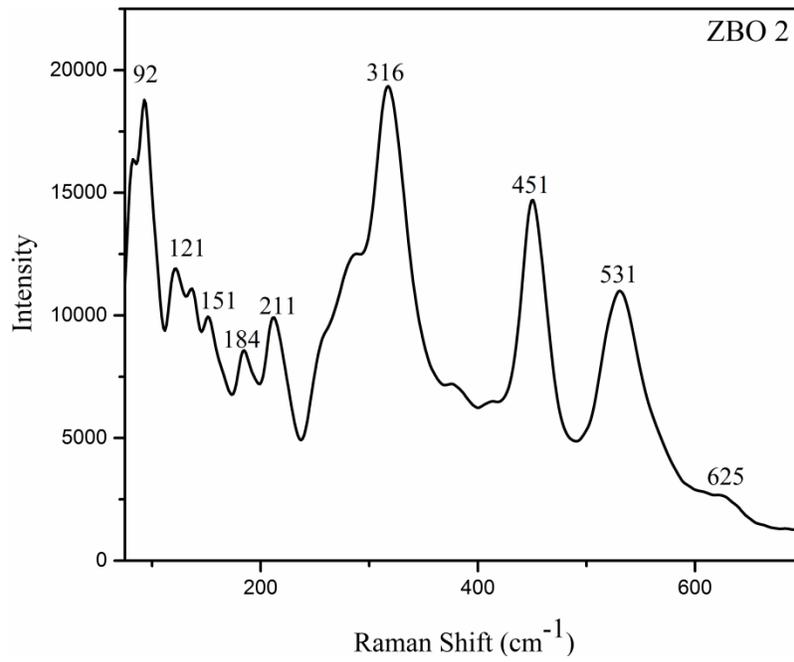**Figure S5** Raman spectrum of Bismuth oxide

**Figure S6** Raman spectrum of zinc doped bismuth oxide in 2 vol%
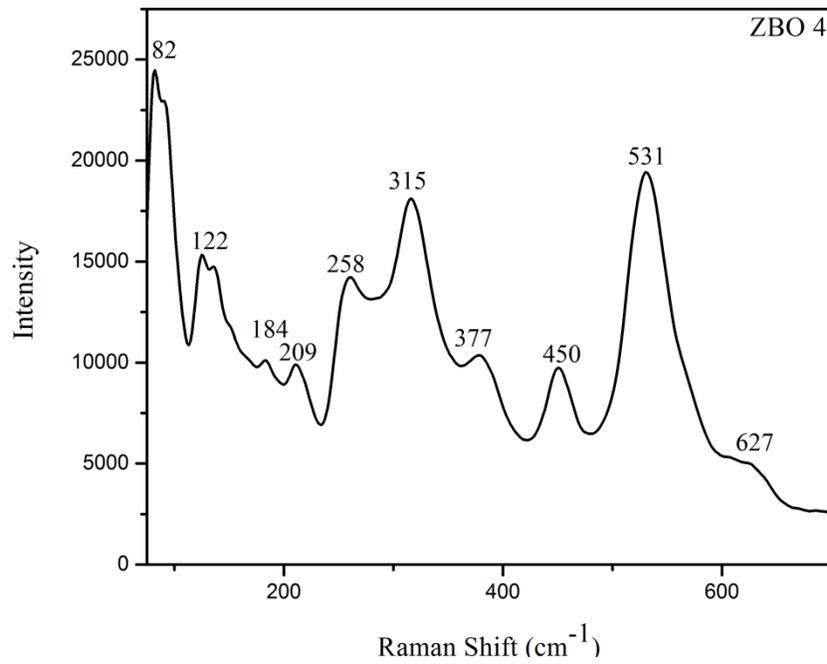


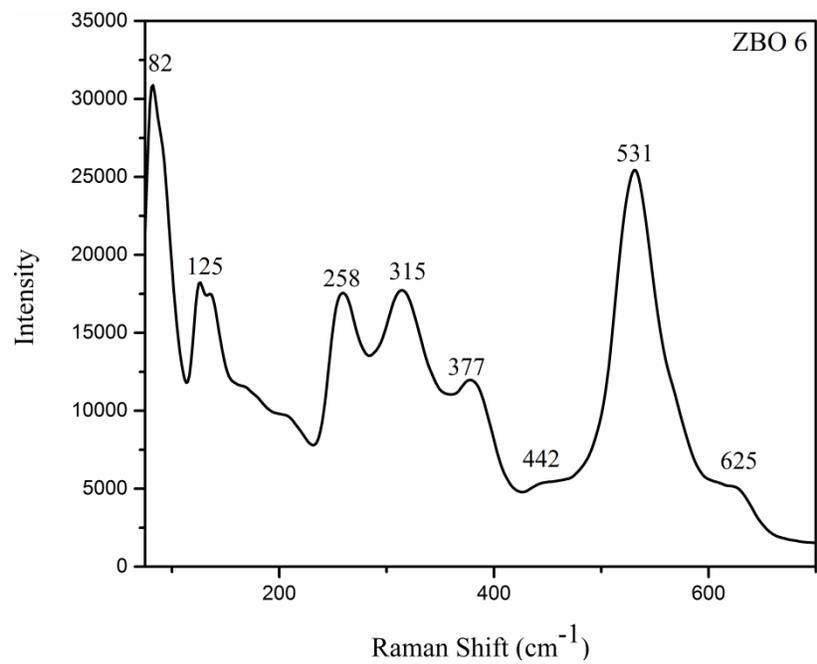**Figure S7** Raman spectrum of zinc doped bismuth oxide in 4 vol%

**Figure S8** Raman spectrum of zinc doped bismuth oxide in 6 vol%
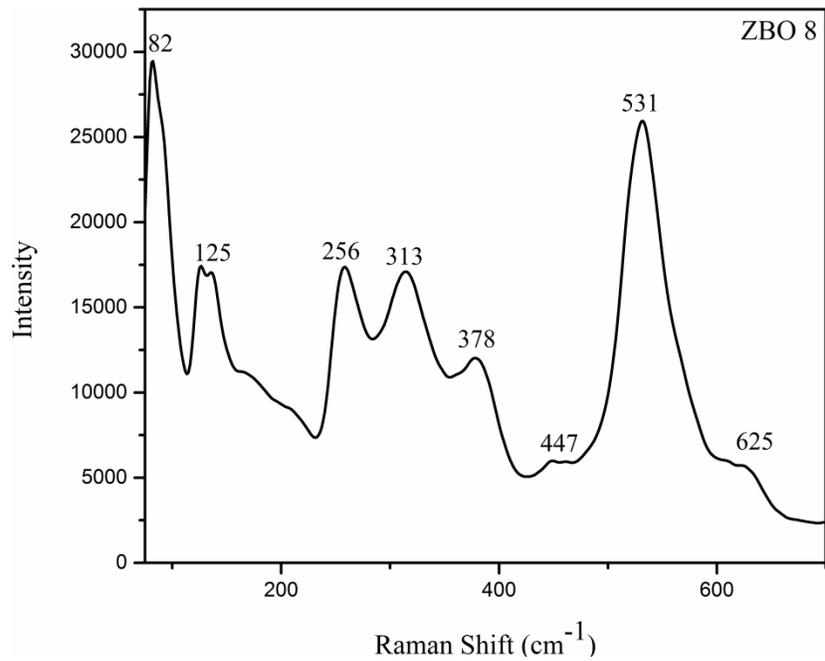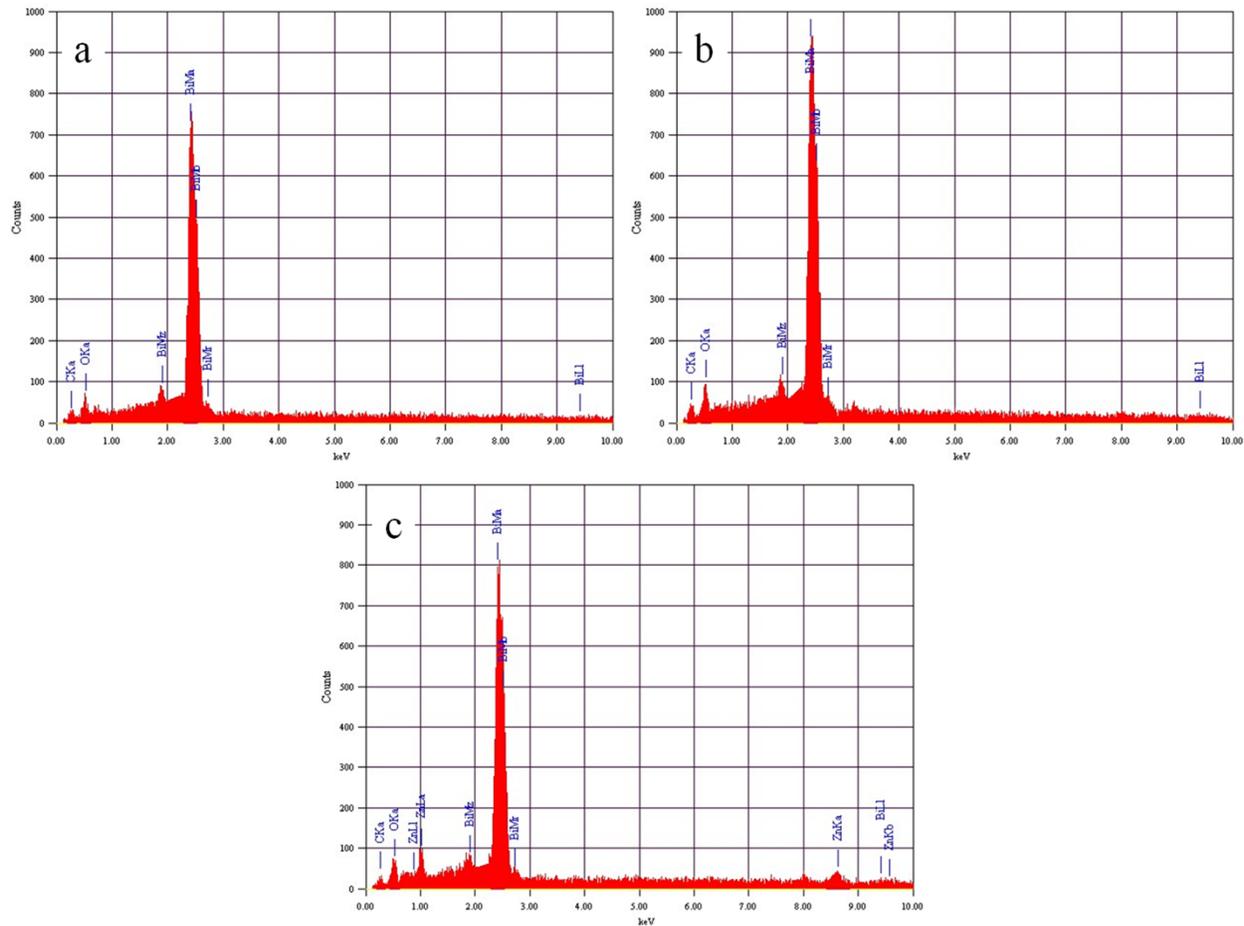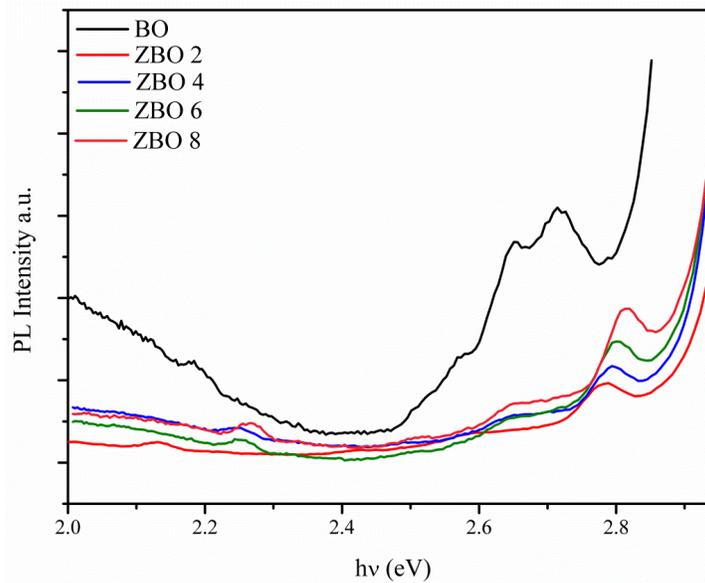


**Figure S9** Raman spectrum of zinc doped bismuth oxide in 8 vol%

**Figure S10** EDS spectrum (a) BO (b) ZBO 2 (c) ZBO 8



**Figure S11** PL curve to calculate the bandgap of the samples

The cyclic voltammetric measurements were conducted for the determination of the band edge positions of the metal oxides using the supporting electrolyte 0.1M Na2SO4 in aqueous medium. The HOMO and LUMO levels are determined by the equation[1]

$$E_{HOMO} = -I_p = -[E_{oxidation}+4.71]eV$$

$$E_{LUMO} = -E_a = -[E_{reduction}+4.71]eV$$

The values of the LUMO levels of the doped systems are compared and given in the Table . The LUMO levels shows the trend of increase in value. The Band edge changes from -3.49 to -2.88eV. The increase in bandgap obtained from the optical measurement is confirmed by the change in the conduction band edge values of the doped metal oxides.

**Table S2.** Band edge determined from cyclic voltammetric measurements Vs Vaccum

| Samples | $E_{HOMO}$ (eV) | $E_{LUMO}$ (eV) |
|---------|-----------------|-----------------|
| BO | -6.2 | -3.49 |
| ZBO2 | -6.0 | -3.41 |
| ZBO4 | -6.0 | -3.03 |
| ZBO6 | -6.1 | -2.98 |
| ZBO8 | -6.1 | -2.88 |

Reference: 1. Haizheng. Zhong, Shun. S. Lo, Tihana. Mirkovic, Yunchao. Li, Yuqin. Ding, Yongfang. Li, Greygory. D. Scholes, *ACS Nano*, 2010, **4**, 5253.