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# Electronic Supplementary Information

## Construction of solar spectrum active SnS/ZnO p-n heterojunction as highly efficient photocatalyst: an effect of sensitization process on its performance

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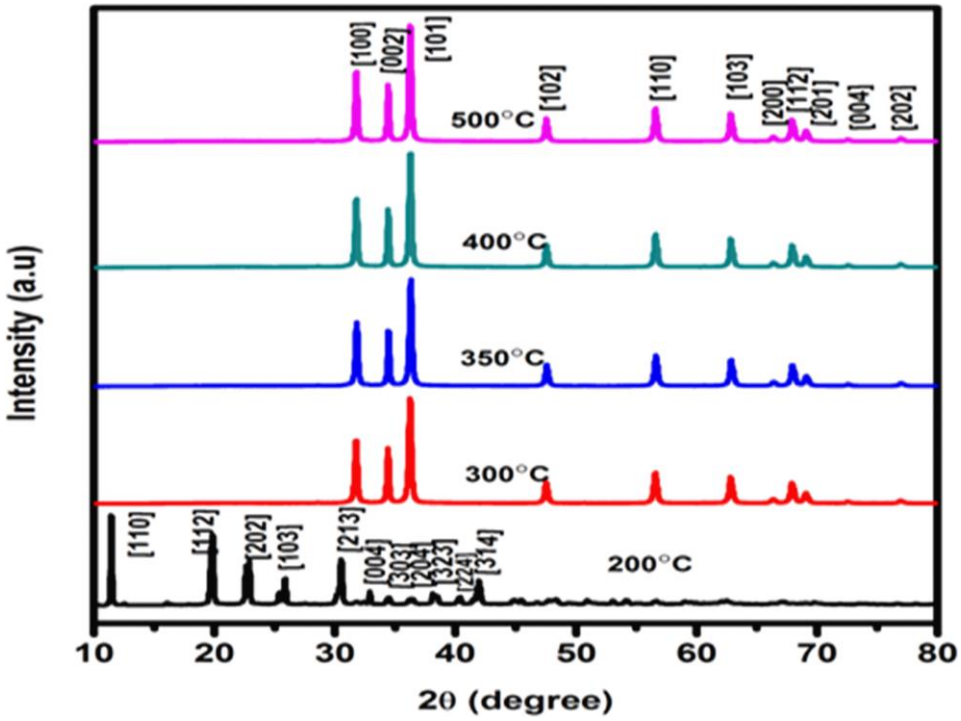


***Figure S1***. *XRD patterns of as-synthesized pristine ZnO nanorods at various temperature.*

Figure S2 (a,b,c,d,e) represents the FESEM image of ZnO calcined at 2000$^0$C, 300$^0$C, 350$^0$C/6h, 400$^0$C and 500$^0$C respectively. The growth time of the ZnO nanorods for all the samples as shown in Figure S2(a,b,d,e) is 3h except for the sample in Figure S2 (c) in which the growth time has been increased to 6h to study the role of calcination time duration on the morphology of ZnO nanorods.

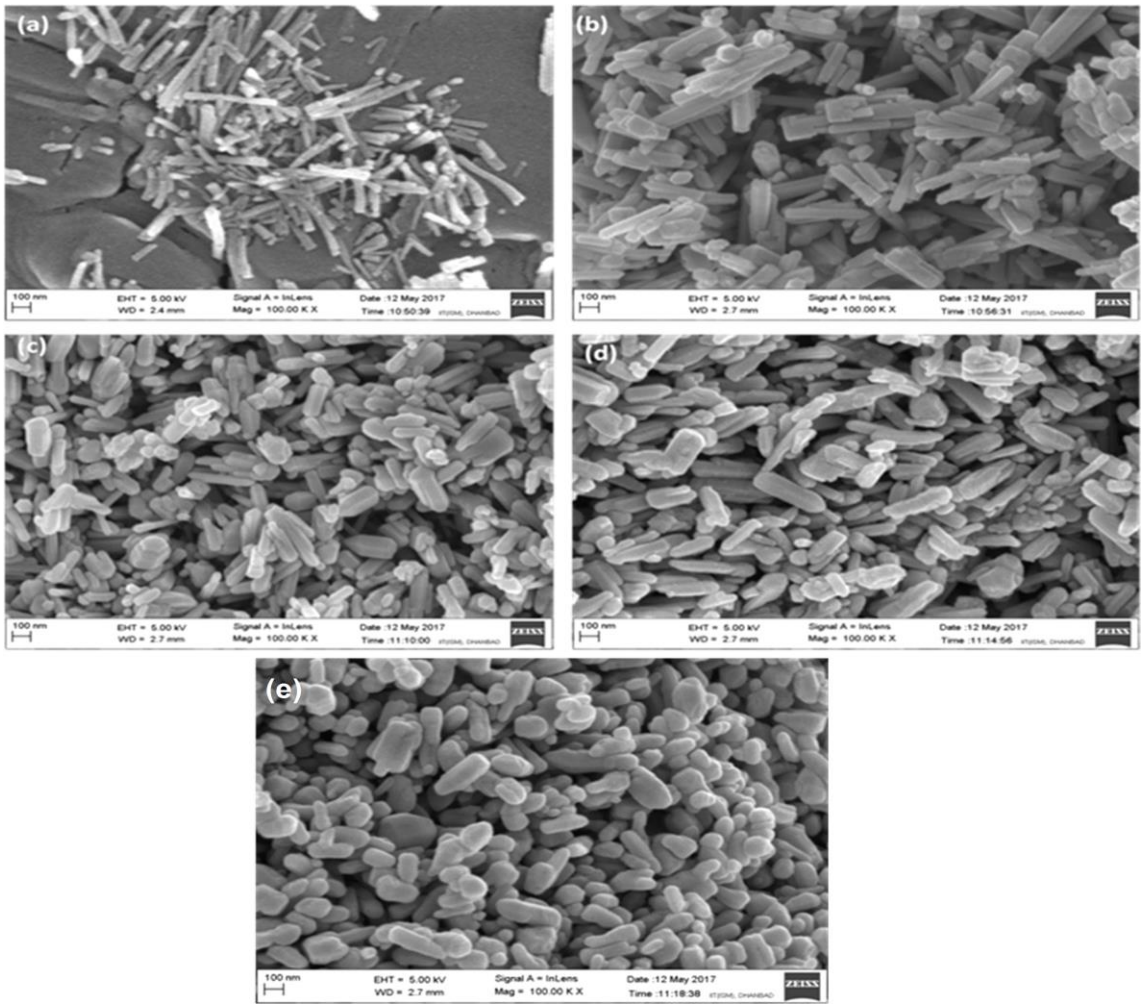


***Figure S2****. FESEM images of as-synthesized pristine ZnO nanostructures at various temperatures of (a)200°C (b) 300°C (c) 350°C/6h (d) 400°C (e) 500°C*

Thus we can conclude that along with an increase in temperature if we increase the time duration of calcination there is a diminishment in the size of ZnO nanorods. Increase in the calcination temperature to 400°C and 500°C leads to the formation of irregularly shaped ZnO nanoparticles.

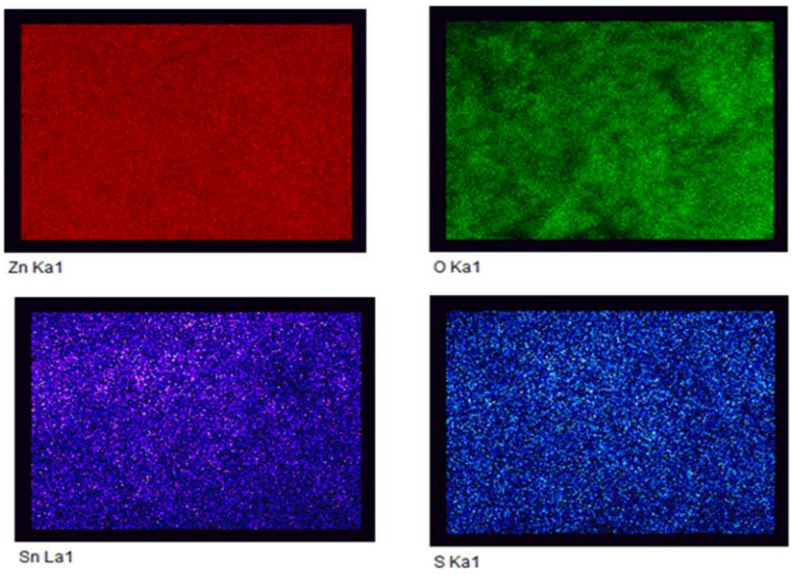


***Figure S3****. Zn, O, Sn and S elemental mapping for SnS sensitized ZnO nanorods from EDX measurement.*

***Table 1:*** *Elemental composition of ZnO nanorods synthesized at 300°C and 350°C/3h respectively obtained from EDX measurement.*

| **ZnO/300°C** | | | **ZnO/350°C/3h** | | |
|---|---|---|---|---|---|
| ***Element*** | ***Weight%*** | ***Atomic%*** | ***Element*** | ***Weight%*** | ***Atomic%*** |
| **C** | **11.60** | **30.69** | **C** | **3.31** | **10.70** |
| **O** | **19.25** | **38.22** | **O** | **18.87** | **45.84** |
| **Zn** | **61.37** | **29.83** | **Zn** | **70.69** | **42.03** |
| **Pt** | **7.78** | **1.27** | **Pt** | **7.13** | **1.42** |

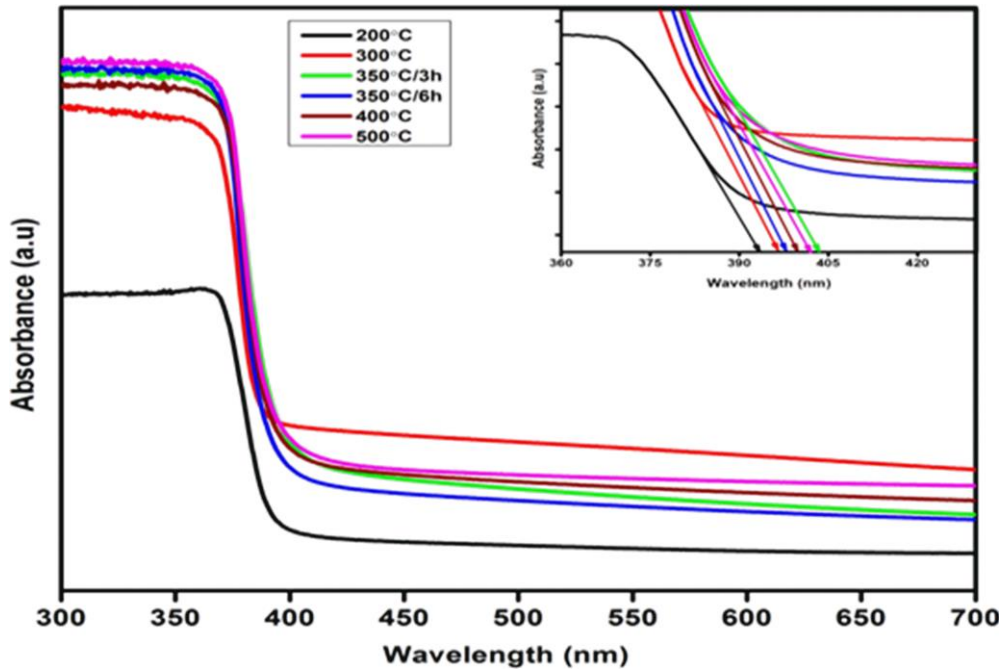


***Figure S4****. UV-Vis absorbance spectra of ZnO nanostructures prepared by calcination at 200$^0$C, 300$^0$C, 350$^0$C/3h, 350$^0$C/6h, 400$^0$C and 500$^0$C. Inset shows the absorption edge of as-synthesized samples.*

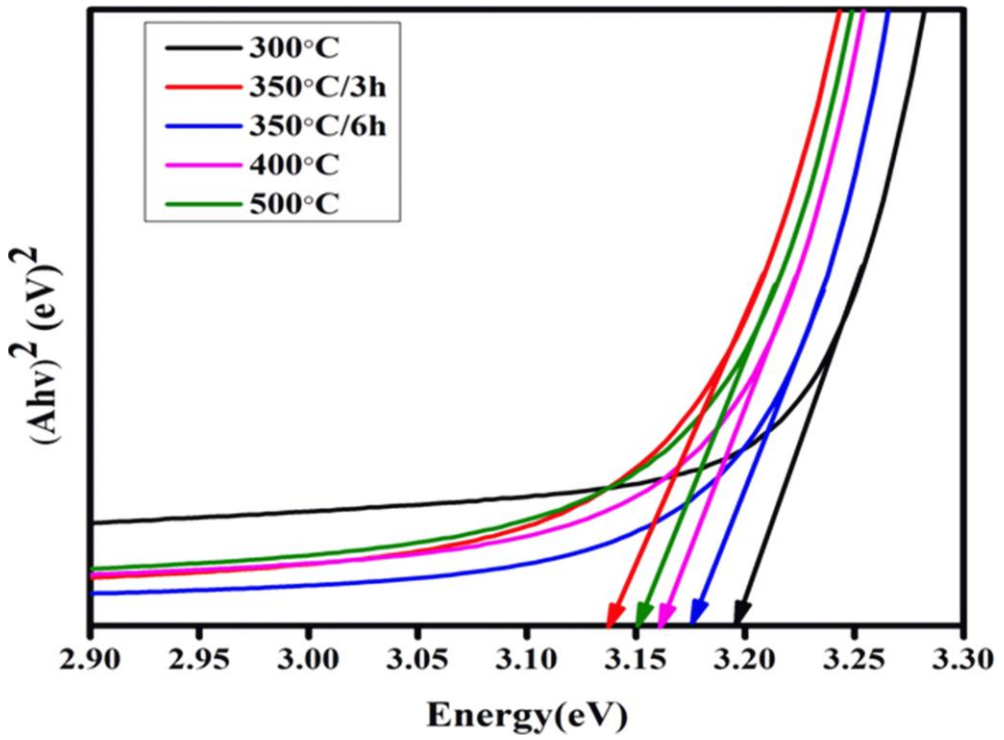


***Figure S5****. Calculation of band gap values for pristine ZnO synthesized at various temperatures using Tauc's plot.*

***Table 2:*** *Tabular representation of band gap values obtained from UV-Vis and PL spectra of Pristine Zinc Oxide at different decomposition temperature*

| **Thermal decomposition temperature** | **Bandgap value obtained from Tauc's Plot** | **Bandgap value obtained from Photoluminescence spectra** |
|---|---|---|
| $300^0$C | 3.19 eV | 3.12 eV |
| $350^0$C/3h | 3.13 eV | 3.10 eV |
| $350^0$C/6h | 3.17 eV | 3.11 eV |
| $400^0$C | 3.16 eV | 3.10 eV |
| $500^0$C | 3.15 eV | 3.11 eV |