

Novel Zinc Selenate Ternary Nanomaterial; Efficient Platforms for Photocatalysis and Antibacterial Applications

Bhabhina Ninnora Meethal

Department of Chemistry, R. Sankar Memorial SNDP Yogam Arts & Science College, Kozhikode, Kerala-673305

INTRODUCTION & AIM

- ✓ Zinc selenate nanomaterials were synthesized as novel material
- ✓ Minimum precursors were used for synthesis
- ✓ Ensured the formation of ZnSeO_4 by characterisations
- ✓ Investigate the photocatalytic activity of newly synthesised ZnSeO_4
- ✓ Investigate the antibacterial activity against E. Coli bacteria

METHOD - Solvothermal



Zn based compounds

- ❖ Cheap production method
- ❖ High photon absorption cross section
- ❖ Rapid generation of electron-hole pairs

Ethylene Diamine

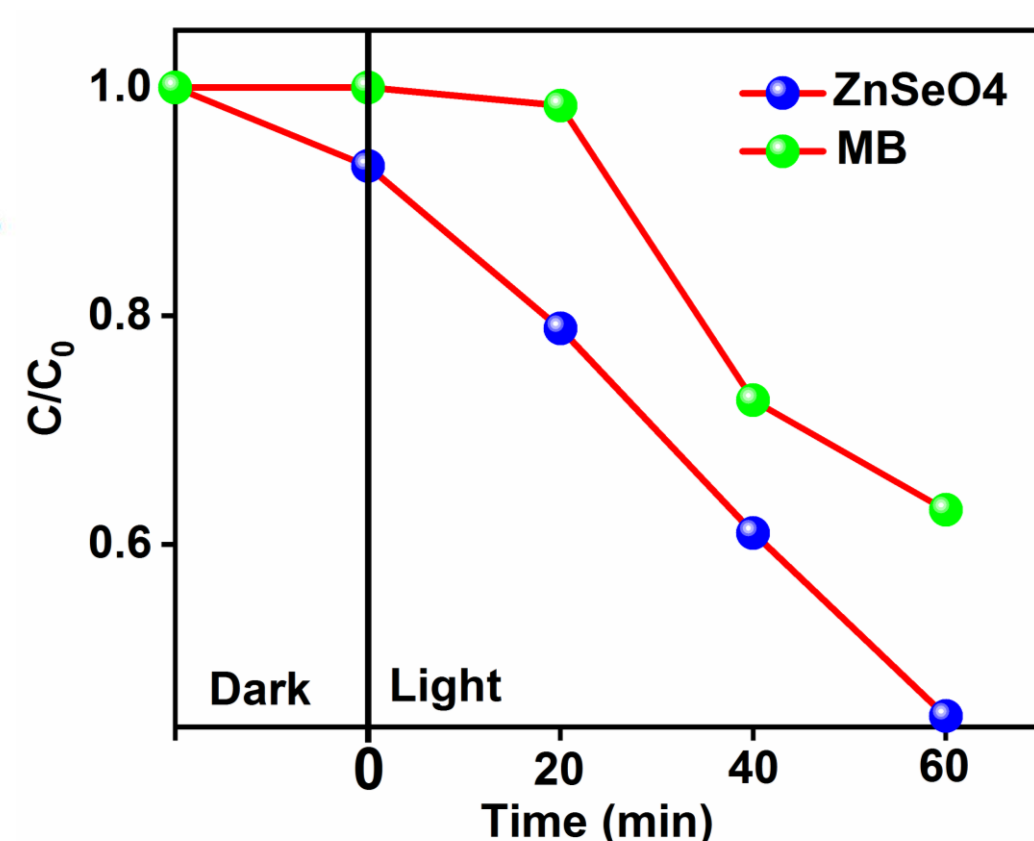
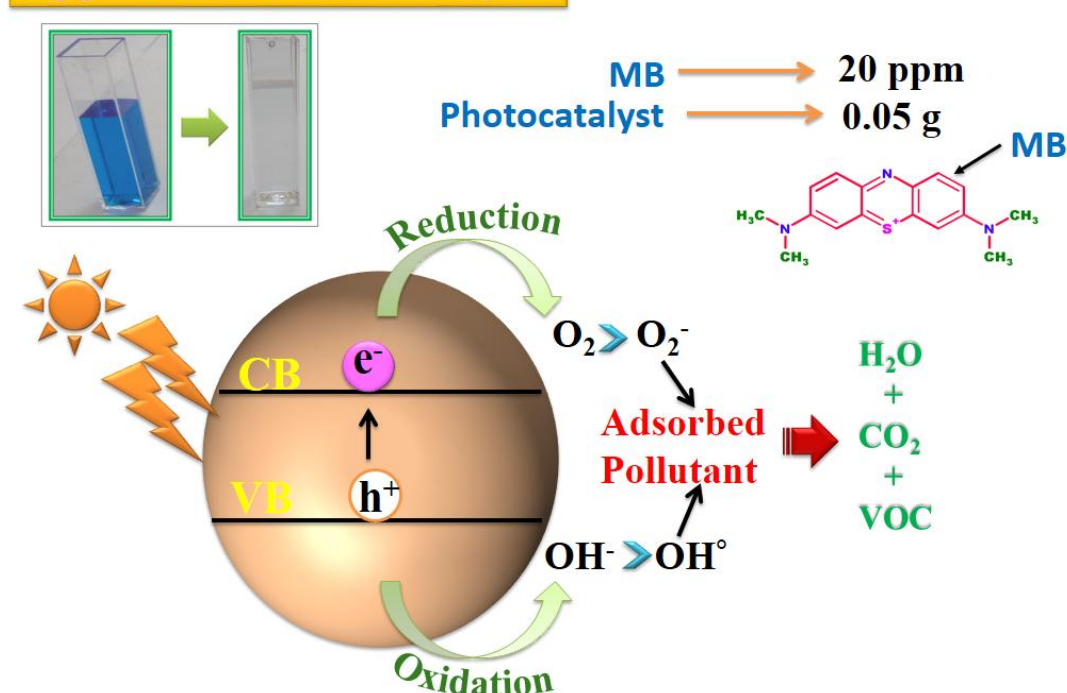
- Solvent used for the synthesis
- $\text{C}_2\text{H}_4(\text{NH}_2)_2$
- Both reducing and capping functions
- Nonpolar liquid

Advantages of Solvothermal Synthesis

- ❖ High product purity and homogeneity
- ❖ Unique pressure-temp interaction during synthesis
- ❖ Single step synthesis
- ❖ Fast reaction time
- ❖ Narrow particle size distribution

APPLICATIONS

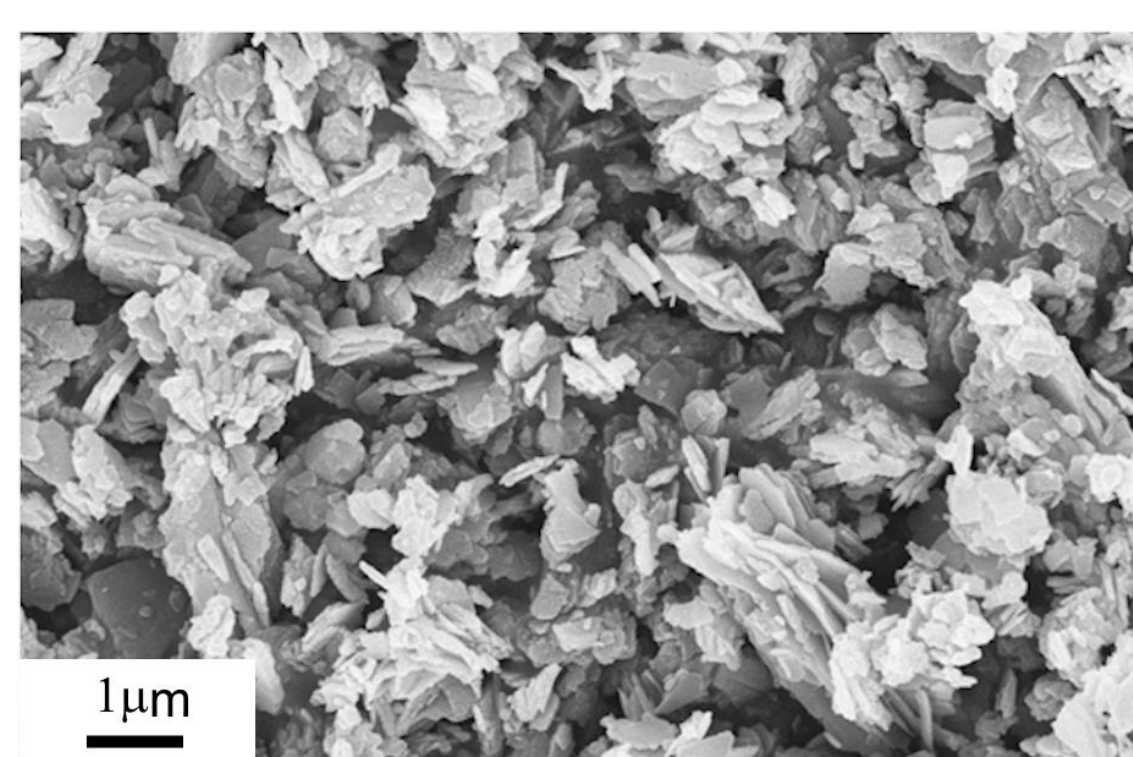
Application -Photocatalysis



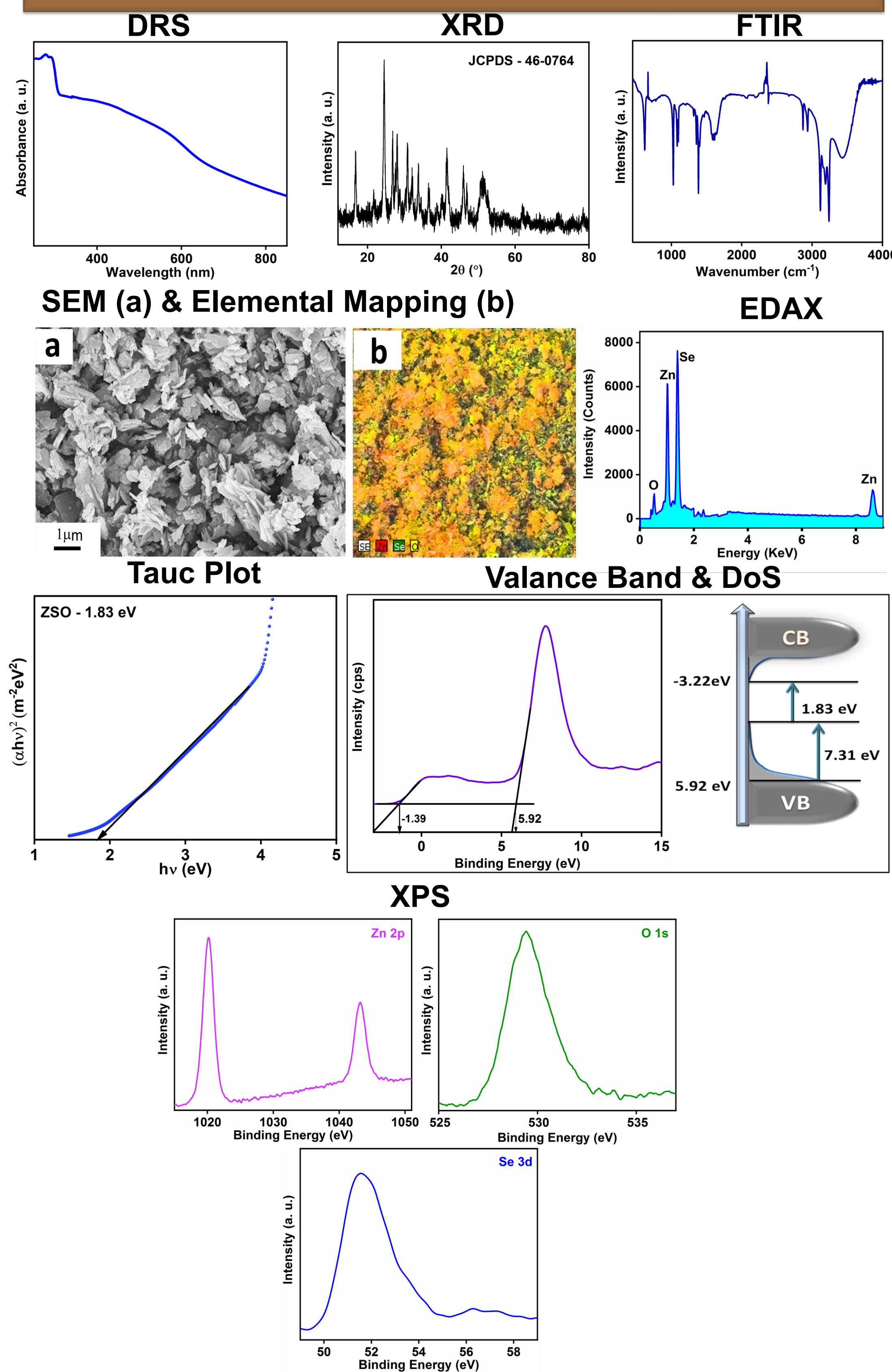
Antibacterial Activity



SEM after Photocatalysis



RESULTS & DISCUSSION



CONCLUSION

CONCLUSION

- ✓ ZnSeO_4 nanoparticle was synthesised by solvothermal method
- ✓ The newly designed ZnSeO_4 shows photocatalytic degradation of MB about 70%
- ✓ Morphology of sample retained after photocatalysis
- ✓ Antibacterial activity of ZnSeO_4 exhibit significant growth inhibitory activity against E. coli and the activity is remarkably high compared with standard tetracycline (antibiotic disc).

REFERENCES

- Niveditha CV, Nandana M, Devika M, Alanta MT, Meera Das KK, Aswani K, Bhabhina NM*, Chemistry Select, (2025), 10, e01676
- Rajita R, Sindhu S, Bhabhina NM*, Int. J. Mater. Res. (2023); aop , 1-7
- Bhabhina NM, Abdul FP, Jabeen FMJ, Dharsana MV, Sindhu S*, Mater & Design, 165 (2019) 107600
- Bhabhina NM, Nijisha P, S. Sindhu*, Mater. & Design., 130, (2017), P426-432
- Bhabhina NM, Rajita R, Sindhu S*, Appl. Nanosci. 8 (6) (2018) p1545-1555
- Bhabhina NM, Sindhu S*, Chemistry Select 3 (2018), 13345–13354