IOCN 2025 Conference

The 5th International Online Conference on Nanomaterials

22–24 September 2025 | Online

MDPI

"Investigation of Hydrothermally Synthesized Cu-SnO_2 and Zn-SnO_2 Nanocomposites for Catalytic Reduction of Para-nitrophenol"

Monika Mishra, Shivam Pandey

Department of Chemistry, School of Applied and Life Sciences, Uttaranchal University, Arcadia Grant, Premnagar, Dehradun, Uttarakhand 248007, India

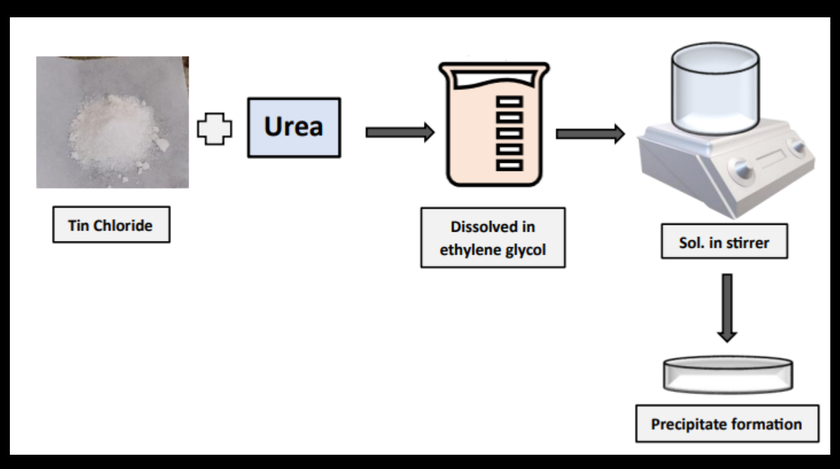
mishramonika248@gmail.com , pandeyshivam547@gmail.com

INTRODUCTION & AIM

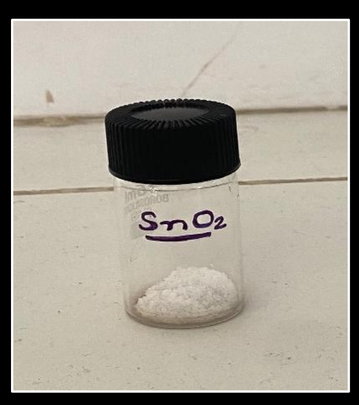
The aim of this study is to investigate Hydrothermally Synthesized Cu-SnO_2 and Zn-SnO_2 Nanocomposites for Catalytic Reduction of Para-nitrophenol. In this study, we synthesized pure SnO_2 nanoparticles (NPs) and Cu-SnO_2 and Zn-SnO_2 nanocomposites using the hydrothermal synthesis method.

SnO_2 NPs exhibit low durability in biological settings and inconsistent cytotoxic effects, despite the encouraging results. Therefore, in order to expand the applications of SnO_2 NPs and enhance their properties, introduction of chemical components (Cu and Zn) into the SnO_2 crystalline structure have been done to form nanocomposites and their physical and chemical properties have been appropriately tailored for a particular purpose.

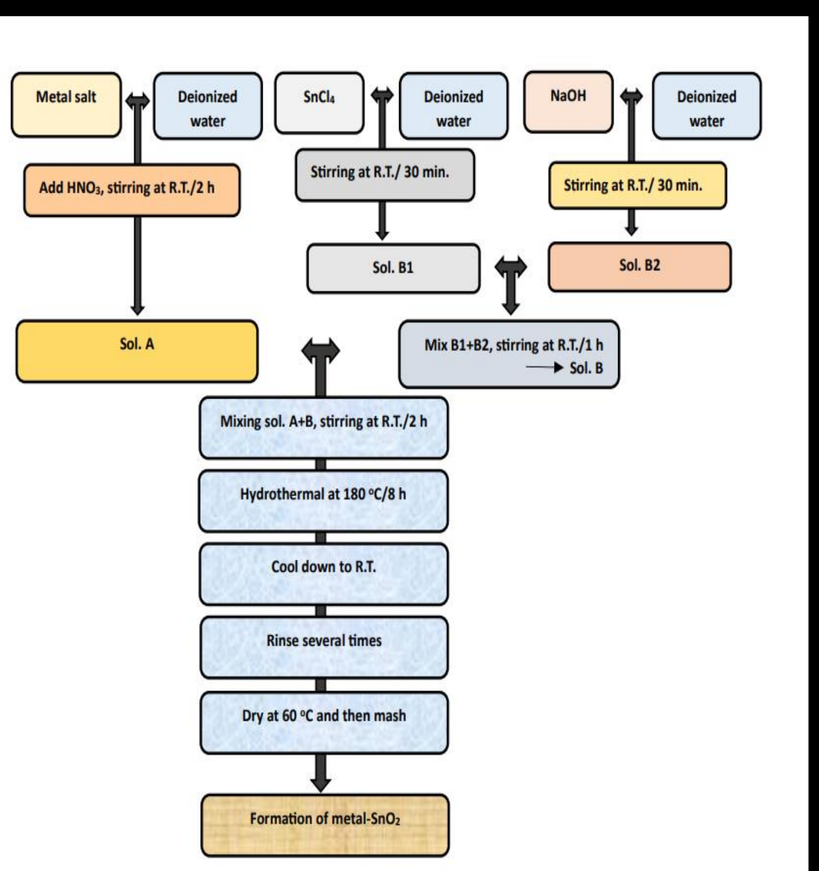
METHOD



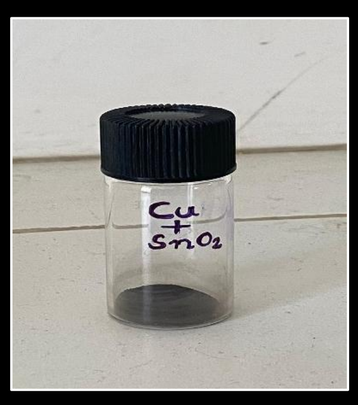
Formation process of SnO_2 NPs



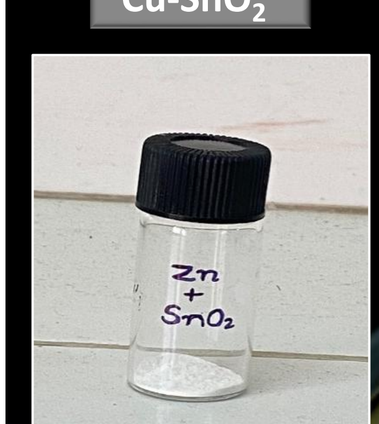
Pure SnO_2



Formation process of metal-SnO_2 NPs



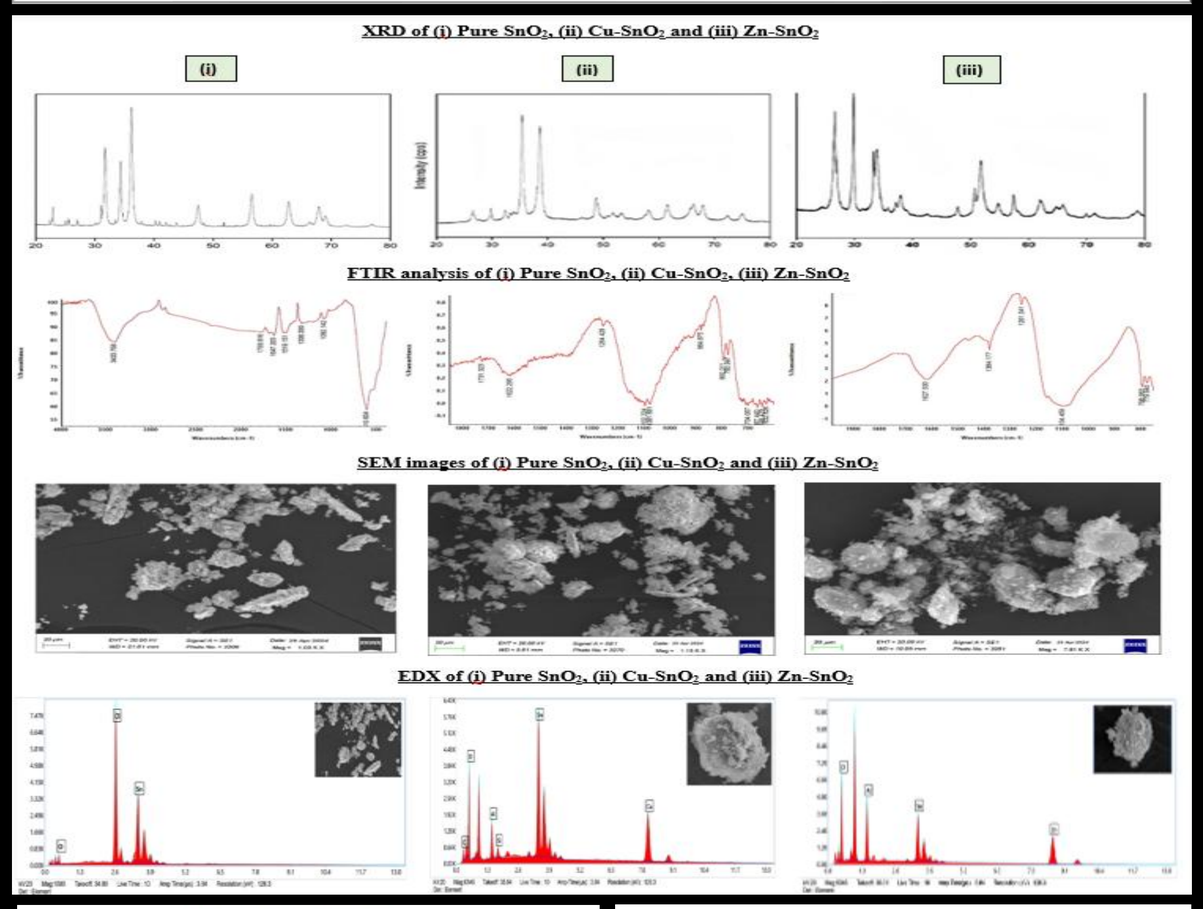
Cu-SnO_2

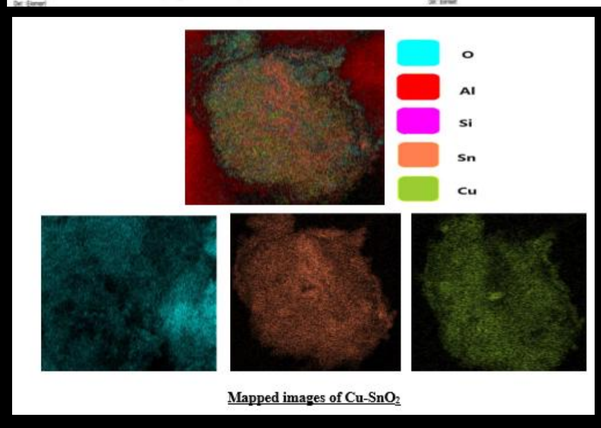


Zn-SnO_2

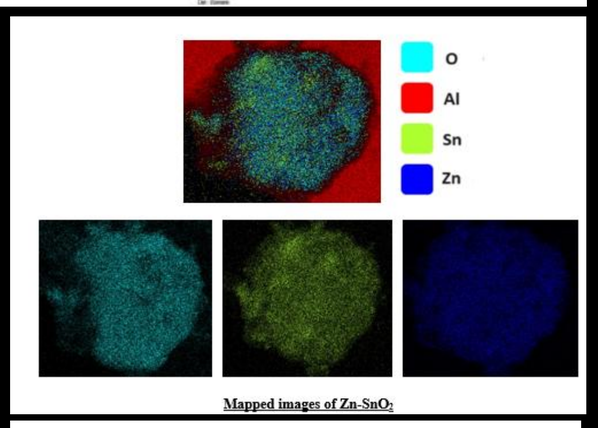
RESULTS AND DISCUSSION

The fabricated NPs and nanocomposites were structurally characterized and comparatively studied by using various analytical techniques.



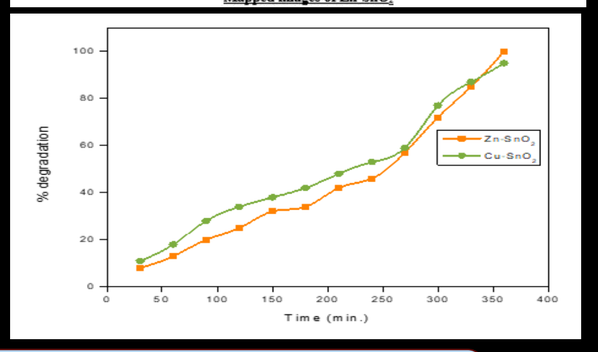


Mapped images of Cu-SnO_2



Mapped images of Zn-SnO_2

Graph showing photocatalytic degradation of Para-nitrophenol due to Cu-SnO_2 and Zn-SnO_2 nanoparticles.



CONCLUSION

The findings indicate that the synthesized NPs can effectively degrade the toxicity of harmful substances, such as para-nitrophenol, found in wastewater. This efficacy can be attributed to the efficient separation of electron–hole pairs made possible by surface modification.

REFERENCES

1. Alali, H. A., Omri, K., Ansari, S. A., Alamer, K., Saber, O., Kotb, H. M., ... & Aleithan, S. H. (2024). Fabrication and impact on photocatalytic activity of Cu-doped ZnO/SnO2 nanostructures with for enhancing the electrochemical performance. *Transition Metal Chemistry*, 1-11.

2.Butola, D., & Purohit, L. P. (2024). Exceptional stability and reusability of Cu-doped ZnO: SnO2 nanocomposites for photocatalysis under visible light. *Materials Chemistry and Physics*, *328*, 130021.