

# Photocatalytic Behaviour of Powdered Manganese (Mn) and Iron (Fe) doped Tin Oxide nanomaterial

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## INTRODUCTION & AIM

- Tin oxide ( $\text{SnO}_2$ ) is an inorganic compound with optical transparency, electrical conductivity, and chemical stability.
- It has become advanced type of material that have valuable applications in removing dyes from wastewater and addressing significant environmental problems.
- This study focuses on the photocatalytic properties of 3d transition metal, specifically manganese (Mn) and iron (Fe), emphasizing the role of unpaired electrons in enhancing photocatalytic activity.
- The photocatalytic activity results revealed of Sn-Mn-Fe- $\text{O}_2$  has a better photocatalytic performance of methyl orange (MO) dye solution as compared to pristine  $\text{SnO}_2$ .

## METHOD

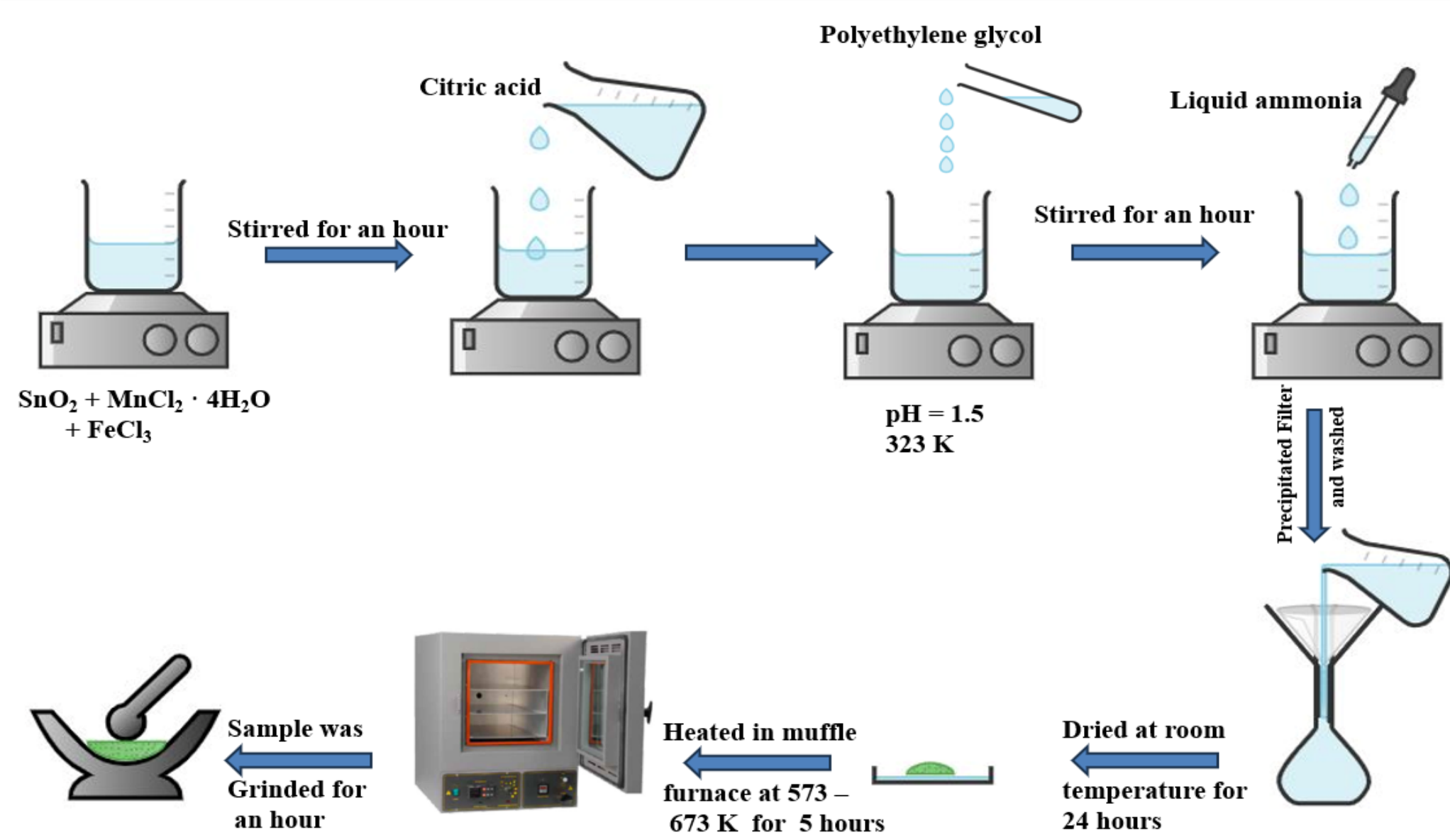


Figure 1: Schematic diagram for synthesis of Sn-Mn-Fe- $\text{O}_2$ .

## RESULTS & DISCUSSION

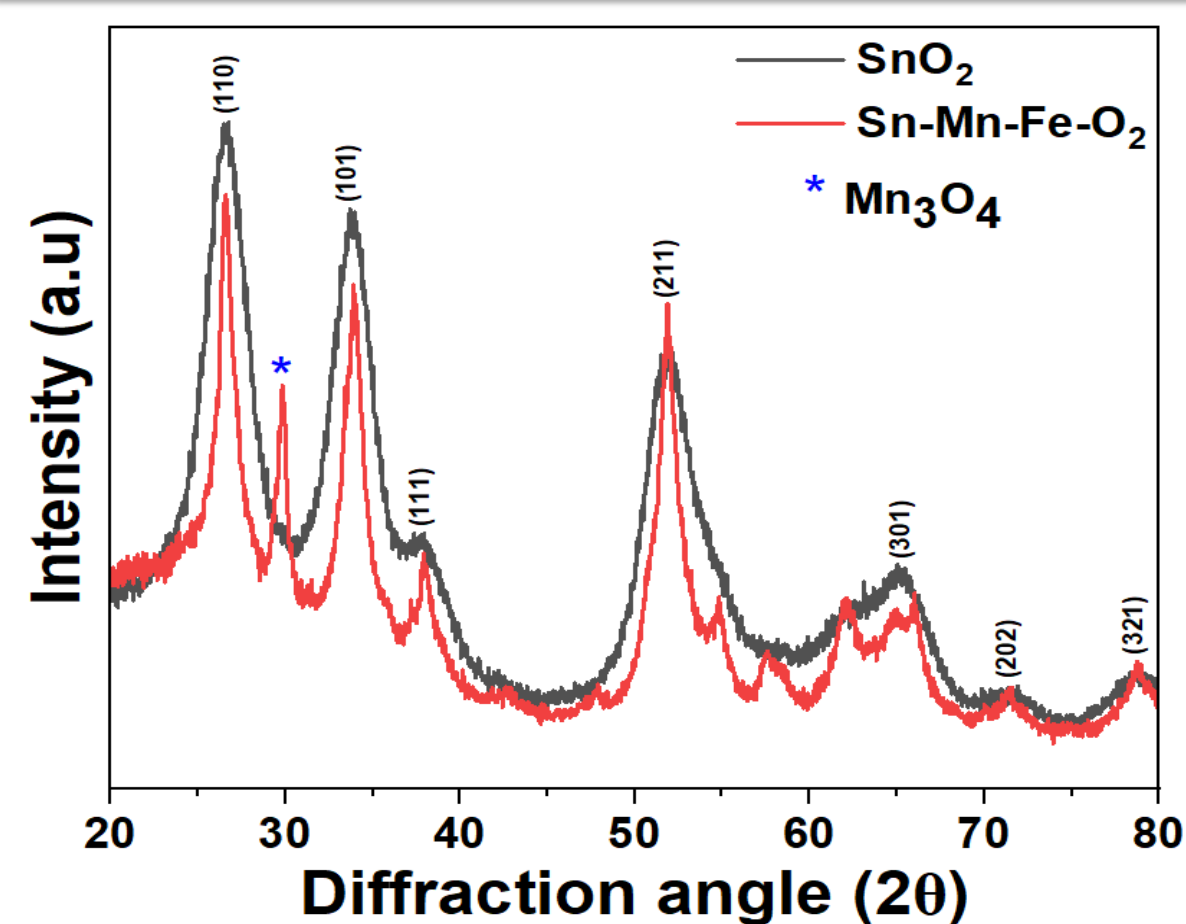


Figure 2: XRD spectra

## ACKNOWLEDGEMENT

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## RESULTS & DISCUSSION

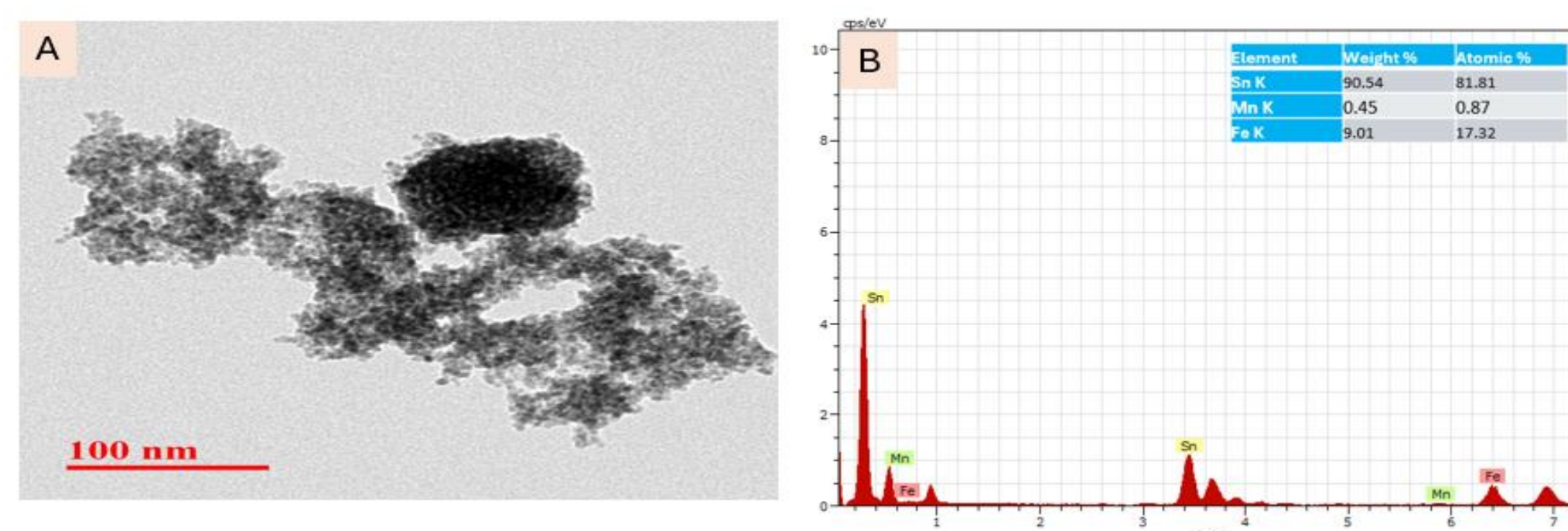


Figure 3: (A) TEM (B) EDX

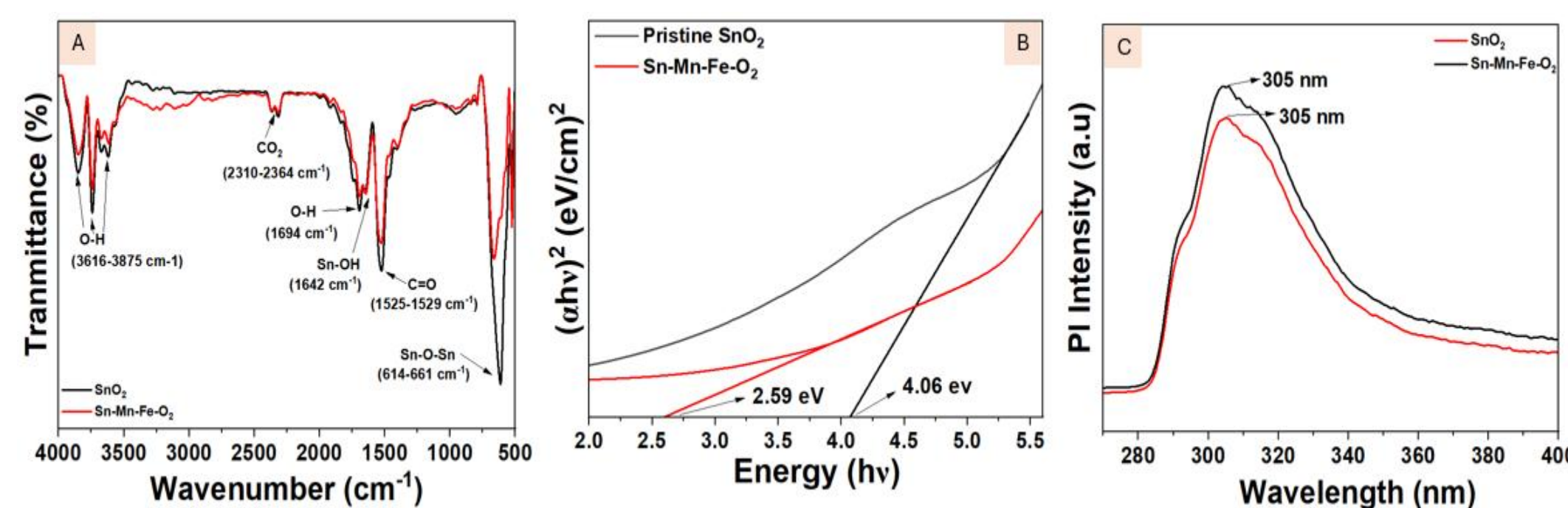


Figure 4: (A) FT-IR (B) Tauc Plot (C) PL Spectra

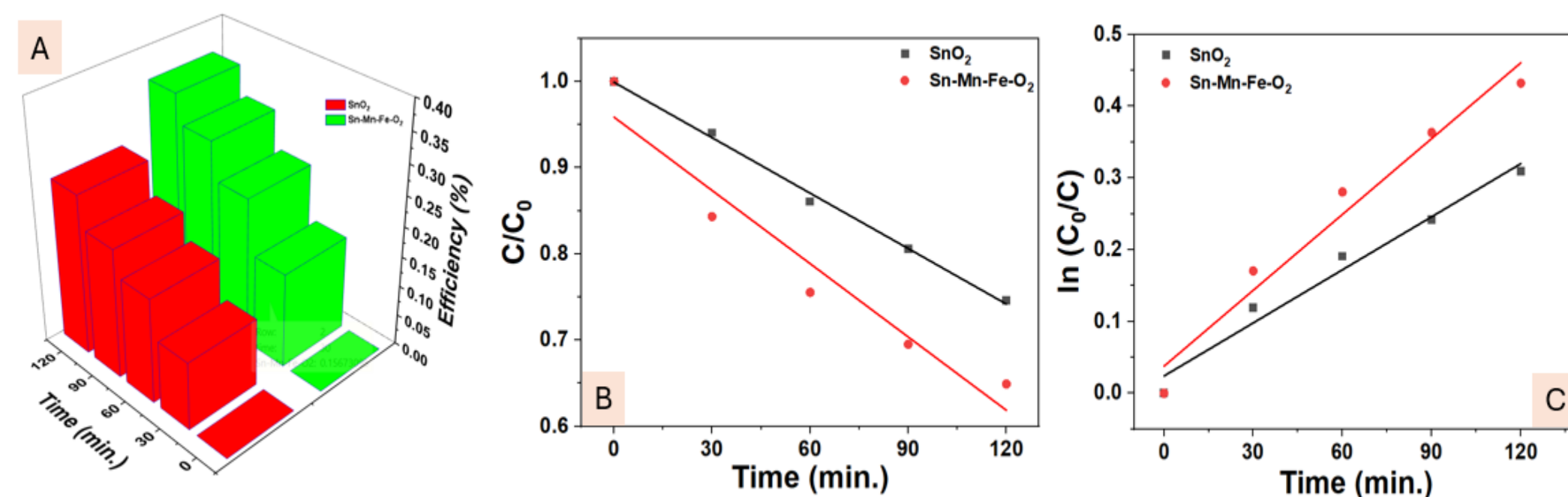


Figure 5: (A) Efficiency and Kinetics graph (B) Zeroth Order (C) First Order

## CONCLUSION

- XRD confirmed the successful incorporation of dopants into the  $\text{SnO}_2$  lattice, with slight peak shifts indicating lattice distortion and crystallite size is 3–5 nm.
- TEM revealed uniformly distributed nanoparticles diameters calculated by Image J software at 3.75 nm.
- $\text{SnO}_2$  nanoparticles demonstrated exceptional photocatalytic efficiency and after doping Mn and Fe efficiency increased up to 44 %.

## REFERENCES

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