

Solar light photocatalytic activity of Zr-doped TiO₂ for degradation of common food colorant: Investigation through combined approach

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INTRODUCTION

Semiconductors are materials that have

conductivity between conductor and insulator.

Semiconductor nanomaterials have extraordinary shapes and structures, Compactness, reliability and

low cost. Semiconductor nanomaterials can be

prepared by both physical & chemical methods.

Semiconductor properties can be greatly improved

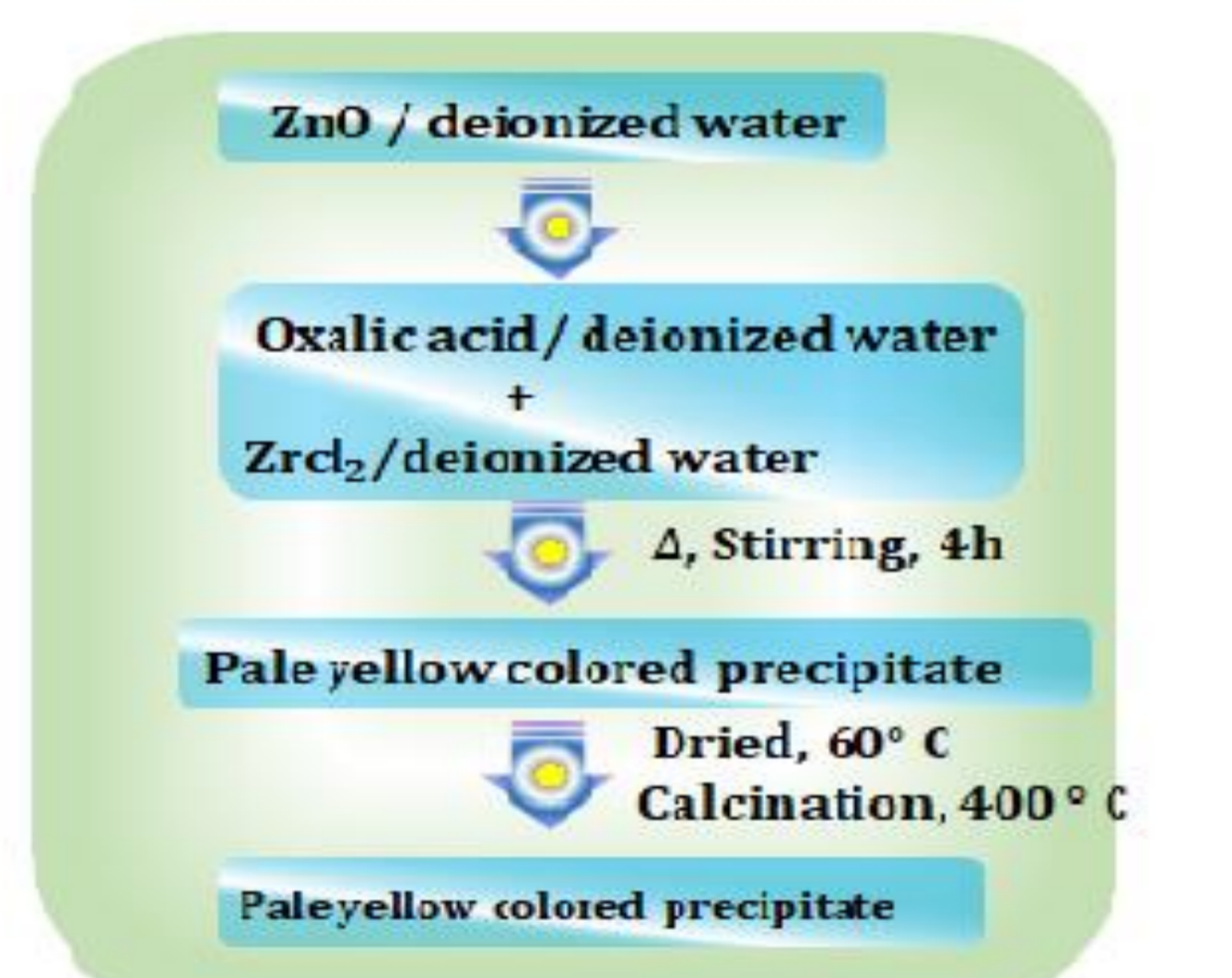
by adding impurities. Semiconductors are greatly

used in light emitting diodes, sensing, catalytic and

biological activities, etc.

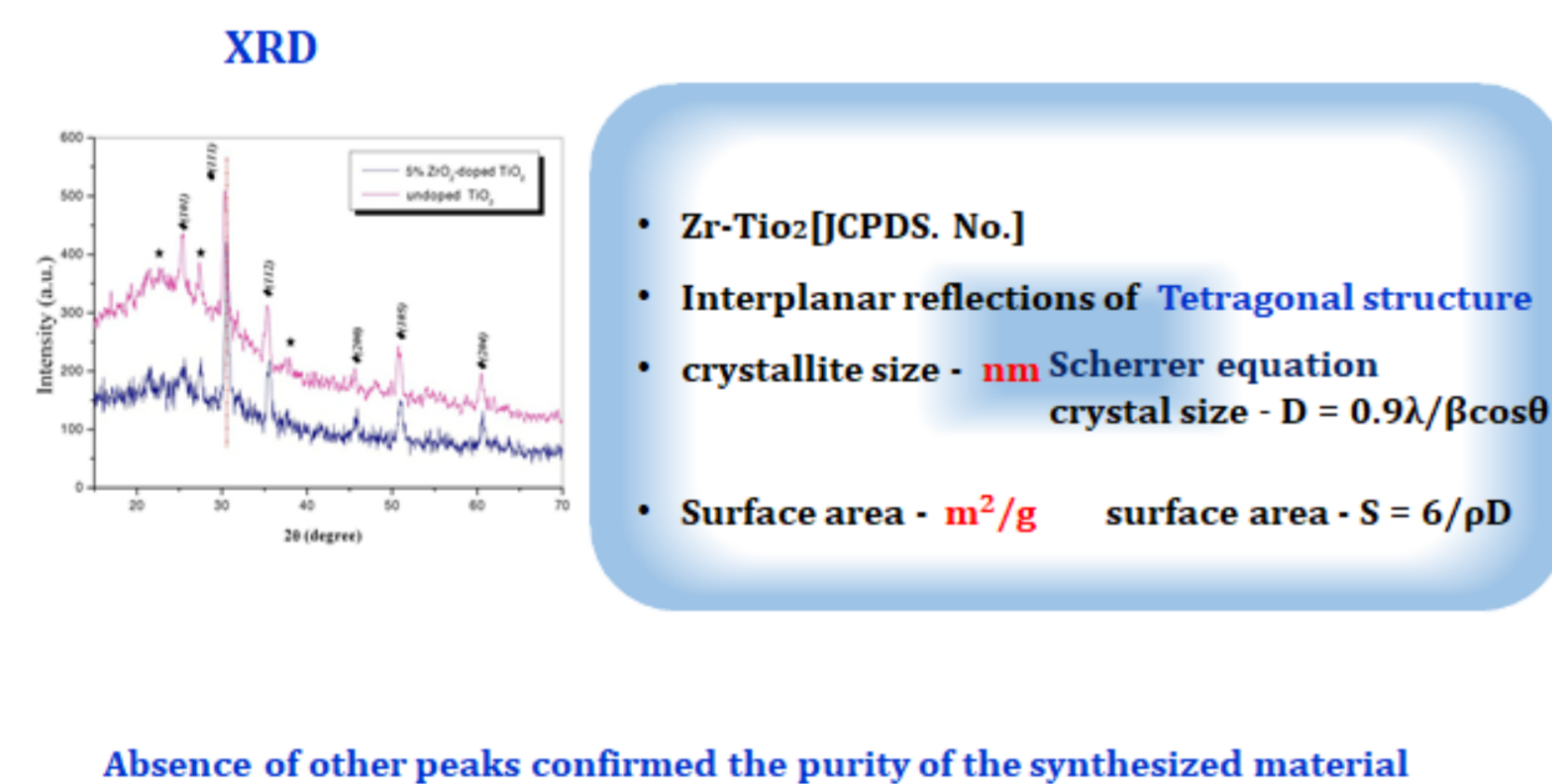
EXPERIMENTAL SECTION

Synthesis of Zr-doped TiO₂



RESULTS AND DISCUSSION

Characterisation

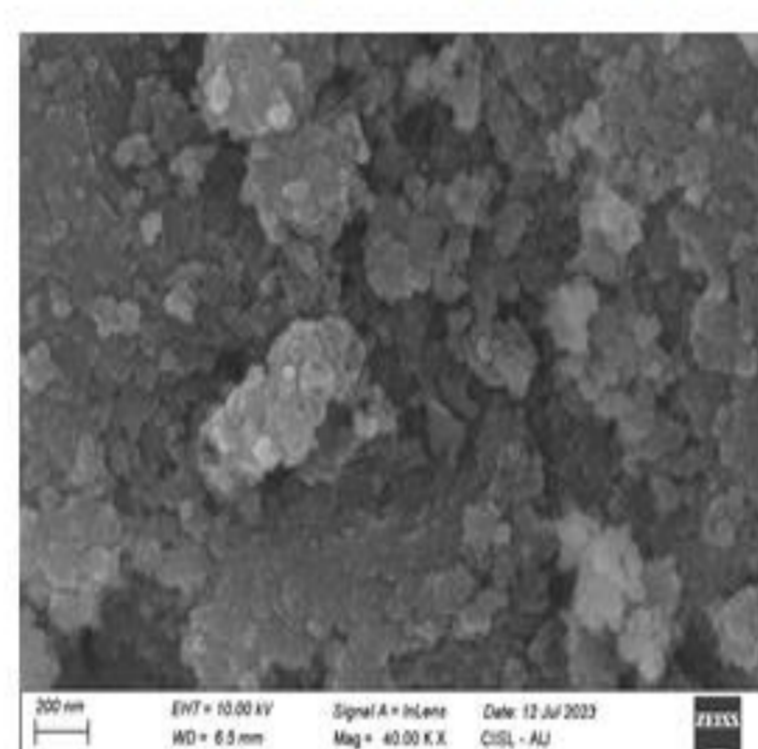


- Zr-TiO₂ [JCPDS. No.]
- Interplanar reflections of Tetragonal structure
- crystallite size - nm Scherrer equation
crystal size - $D = 0.9\lambda / \beta \cos\theta$
- Surface area - m²/g surface area - $S = 6/\rho D$

Absence of other peaks confirmed the purity of the synthesized material

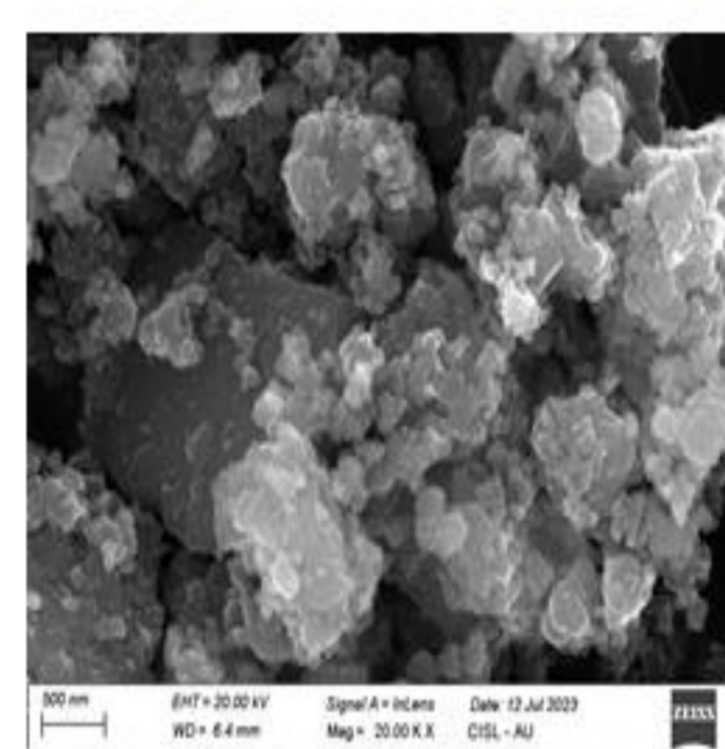
SEM

Scanning electron copy (TiO₂)



spherical shape of TiO₂

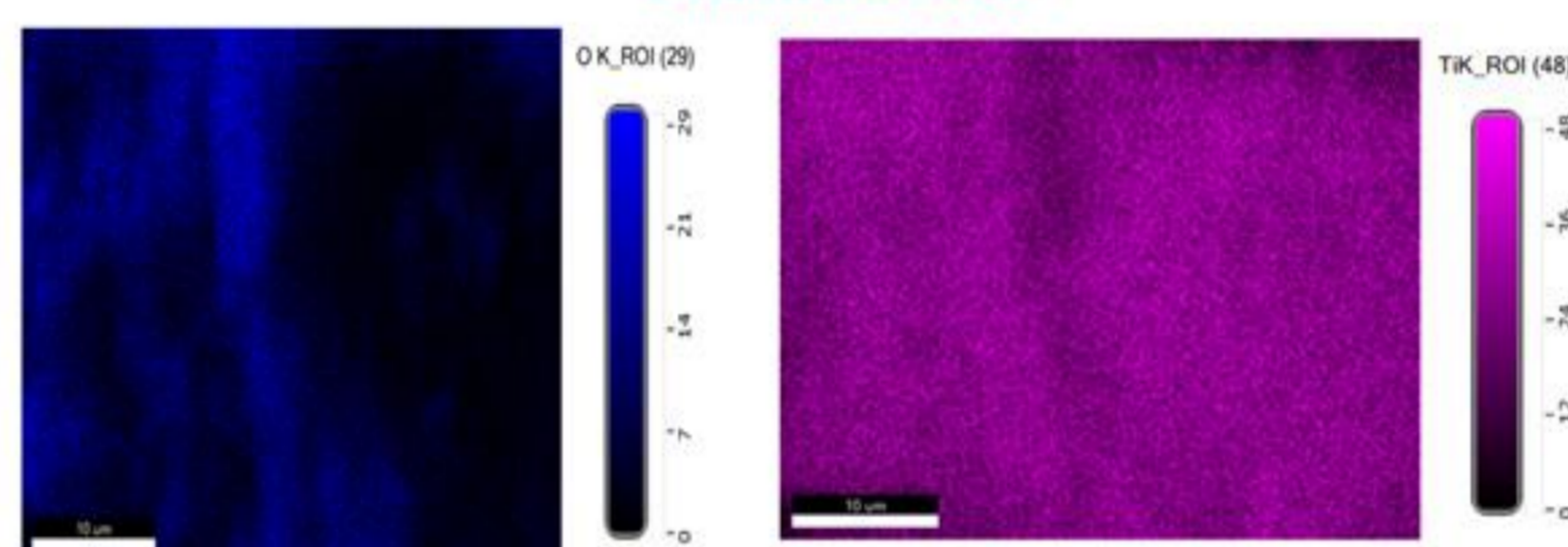
Scanning electron microscopy (Zr-TiO₂)



cubic shape of Zr-TiO₂

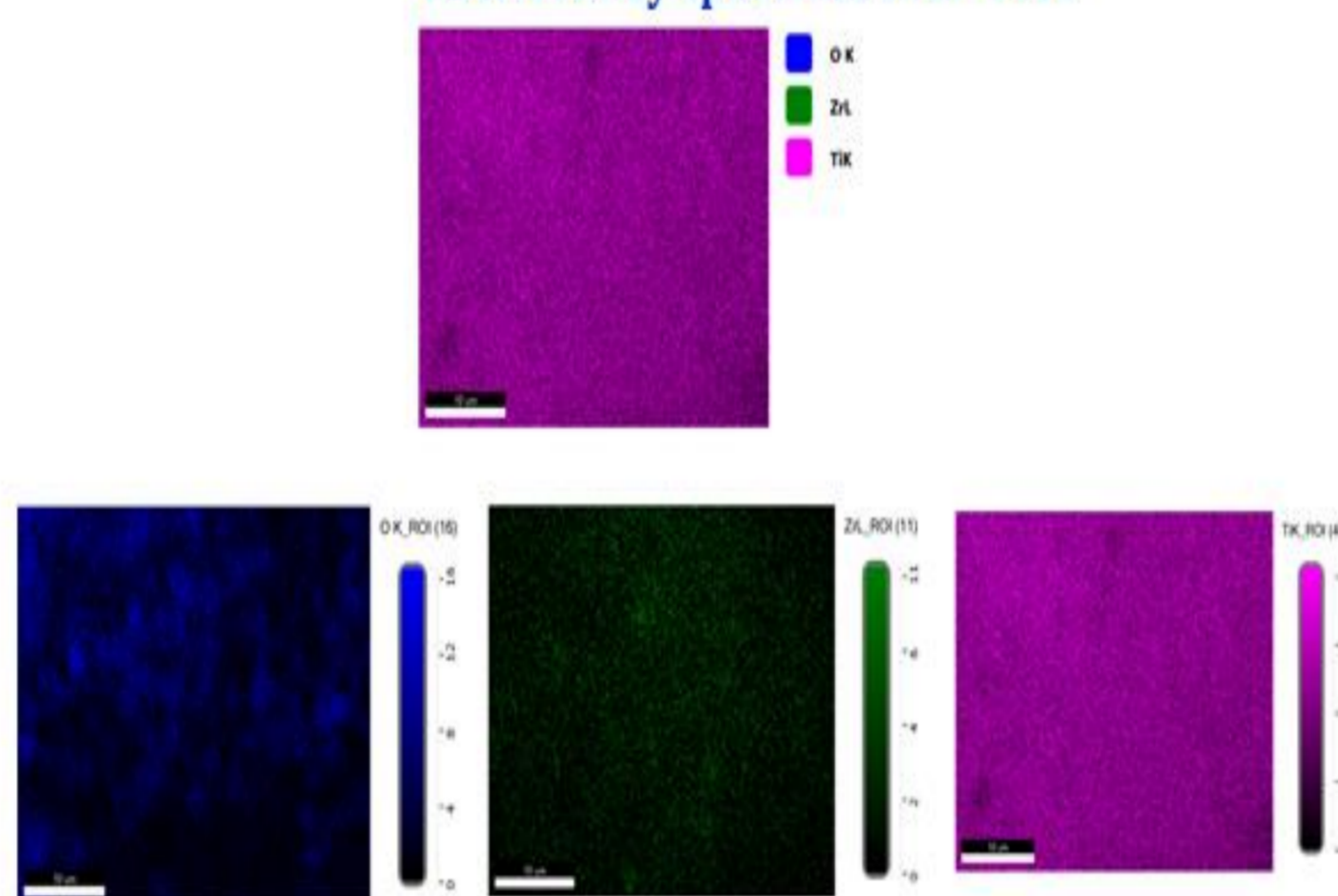
Energy Dispersive X-ray (EDX) Spectrum (TiO₂)

Elemental mapping



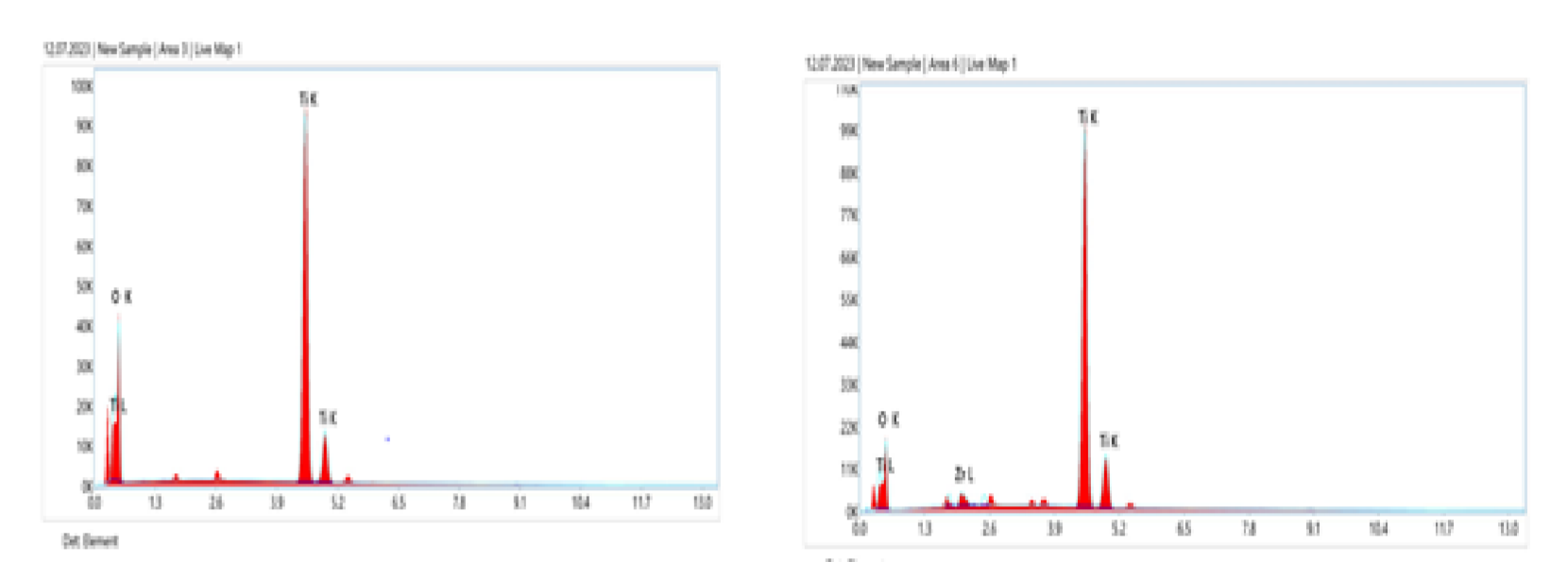
EDAX spectrum confirmed Ti & O even distribution in TiO₂

EDX Overlay spectrum of Zr-TiO₂



EDAX spectrum confirmed Zr, Ti & O₂ even distribution in Zr-TiO₂

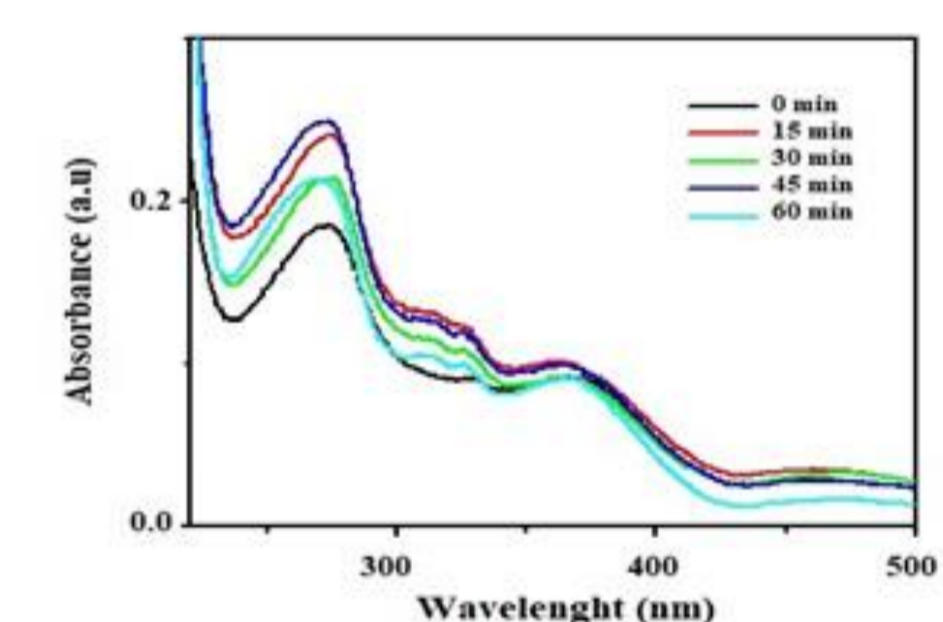
EDX-Elemental Composition



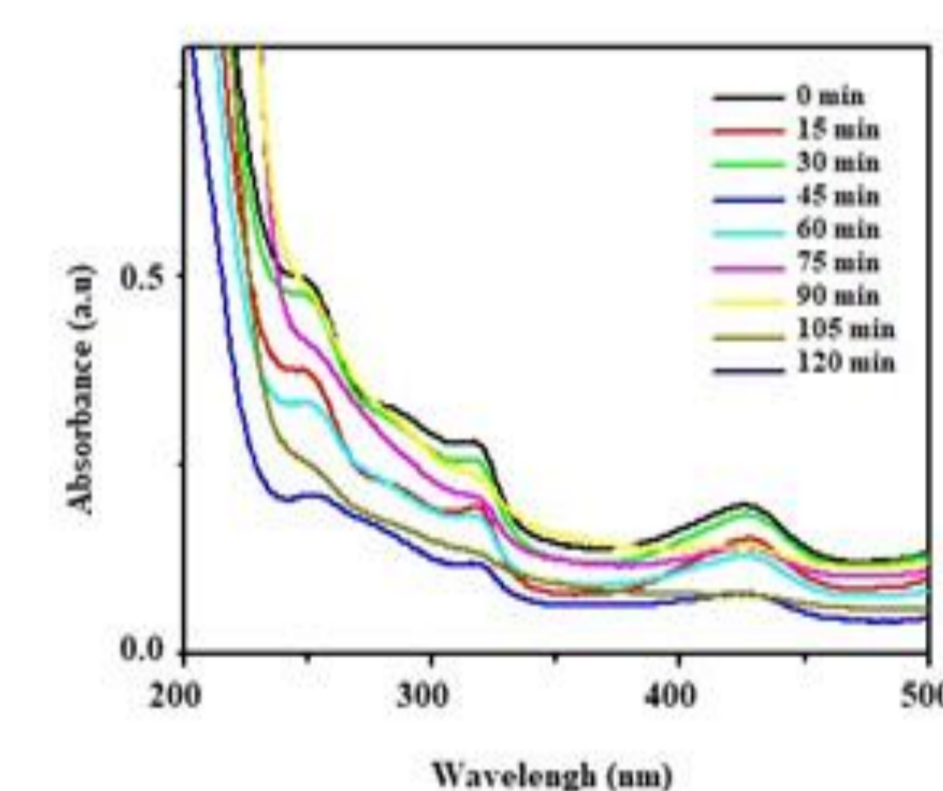
EDAX spectrum confirmed Ti & O elements in TiO₂

EDAX spectrum confirmed Ti & O elements in Zr-TiO₂

Photocatalytic degradation



TiO₂



Zr-doped TiO₂

UV- VIS absorption spectra for aqueous solution of Brilliant Green Dye at different concentration of Zr - doped TiO₂

CONCLUSIONS

- ❖ Synthesis of Zr-doped TiO₂ was prepared by co- precipitation method
- ❖ Characterization was done by XRD, FE- SEM with EDAX
- ❖ XRD results revealed phase and purity of prepared nano materials
- ❖ FE-SEM confirmed the spherical shape of Zr-doped TiO₂
- ❖ EDAX spectrum confirmed Zr , Ti & O in Zr-doped TiO₂
- ❖ Photo degradation was studied using BB dye

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