

Review Form 3

Journal Name:	Journal of Materials Science Research and Reviews
Manuscript Number:	Ms_JMSRR_126730
Title of the Manuscript:	Improving the Photo-catalytic Efficiency of TiO2 by incorporation of Cobalt For Removal of Micropollutants from Wastewater
Type of the Article	Original Research Article

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PART 1: Review Comments

Compulsory REVISION comments	Reviewer's comment	Author's Feedback <i>(Please correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)</i>
Please write a few sentences regarding the importance of this manuscript for the scientific community. Why do you like (or dislike) this manuscript? A minimum of 3-4 sentences may be required for this part.		
Is the title of the article suitable? (If not please suggest an alternative title)		
Is the abstract of the article comprehensive? Do you suggest the addition (or deletion) of some points in this section? Please write your suggestions here.		
Are subsections and structure of the manuscript appropriate?		
Please write a few sentences regarding the scientific correctness of this manuscript. Why do you think that this manuscript is scientifically robust and technically sound? A minimum of 3-4 sentences may be required for this part.		
Are the references sufficient and recent? If you have suggestions of additional references, please mention them in the review form.		

**Review Form 3**

Minor REVISION comments		
Is the language/English quality of the article suitable for scholarly communications?		
Optional/General comments	<div><div>1. What is the significance of Sharp peaks in X ray diffraction.</div><div>2. Explain in detail FTIR and UV analysis based on energy levels.</div><div>3. What is the significance of absorption</div><div>In Fig.5 and what indicates broad humps.</div><div>4. Explain in detail Photo-degradation Mechanism.</div></div>	<div><div>1. The highly intense and sharp peak round of about 25<sup>o</sup> observed in all samples confirms the highly crystalline anatase phase of TiO<sub>2</sub> nanocrystal.</div><div>2. In FTIR, the intensity of IR radiation correlates to the energy gaps across quantized vibrating modes. When the infrared ray meets the energy requisite for a molecular transition, the molecule absorbs it, causing the associated vibrating mode to be stimulated. Each absorbing wavelength can be observed as a peak in the FTIR spectrum. These peaks' positions correlate to the vibrational frequencies of distinct bonds, making it possible to identify particular functional groups.</div><div>Co-doped TiO<sub>2</sub> has a narrower band gap due to added energy levels from dopants. These intermediate states enable electrons to switch with less energetic photons, transforming absorption to the visible spectrum and increasing the material's photocatalytic effectiveness under sunlight.</div><div>3. Broad humps might suggest an appearance of intermediate energy states within the band gap, which are caused by Co<sup>+2</sup> ions. These states, also known as "trap states" or "mid-gap states," facilitate more light absorption at lower energies than the pure band gap, that extends absorption into the visible domain of light.</div><div>4. Photogenerated electrons migrate to the outermost layer of TiO<sub>2</sub> nanocrystals and transform molecular oxygen (O<sub>2</sub>) into reactive superoxide (O<sub>2</sub><sup>-</sup>). After that holes created by sunlight approach the surface, they can oxidize hydroxide ions (OH<sup>-</sup>) or water (H<sub>2</sub>O), producing hydroxyl radicals (•OH). Methylene blue molecules get destroyed by hydroxyl radicals (•OH) and superoxide radicals (O<sub>2</sub><sup>-</sup>), causing the complicated chemical arrangement of MB to disintegrate into smaller, harmless or environment-friendly substances like CO<sub>2</sub>, H<sub>2</sub>O, and other least hazardous inorganic elements.</div></div>

**PART 2:**

	Reviewer's comment	Author's comment (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
Are there ethical issues in this manuscript?	(If yes, Kindly please write down the ethical issues here in details)	