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REVIEWER'S REPORT

Manuscript No.: IJAR-51977 Date: 29 May 2025

Title: How Heavy Metals Influence Microplastic Degradation: UV Absorption and Photoreactivity of PS-Fe_3O_4 Composites

Recommendation:
Accept as it is .....
Accept after minor revision.....
Accept after major revision .....√.....
Do not accept (*Reasons below*) .....

Rating	Excel.	Good	Fair	Poor
Originality			√	
Techn. Quality			√	
Clarity			√	
Significance			√	

Reviewer Name: Dr Ahmad Saqar **Date:** 29 May 2025

Reviewer's Comment for Publication.

(*To be published with the manuscript in the journal*)

The reviewer is requested to provide a brief comment (3-4 lines) highlighting the significance, strengths, or key insights of the manuscript. This comment will be Displayed in the journal publication alongside with the reviewers name.

This manuscript addresses the important issue of how heavy metals influence the degradation of microplastics, specifically investigating the UV absorption and photoreactivity of PS-Fe3O4 composites. The study's strengths include its novel approach to examining the synergistic effects of metal oxides on microplastic behavior and its use of detailed spectroscopic analysis. The findings provide valuable insights into environmental degradation mechanisms relevant to contemporary pollution concerns.

Detailed Reviewer's Report

Thank you for inviting me to review the manuscript "How Heavy Metals Influence Microplastic Degradation: UV Absorption and Photoreactivity of PS-Fe3O4 Composites" for IJAR. The study investigates the complex interactions between polystyrene microplastics and iron oxide, contributing meaningful data to the understanding of environmental microplastic degradation pathways. While the manuscript addresses an important environmental issue and

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is methodologically promising, there are significant gaps in clarity, depth, and rigor across several sections. Thus, I recommend major revision before further consideration.

Major Comments

1. Abstract

- ***Could the authors make the objectives, methods, and main findings more explicit and quantitative? Currently, the abstract lacks defined research aims and clear indication of the study's novelty.***

2. Introduction

- ***The background would benefit from deeper context regarding previous work on heavy metals' influence on microplastic degradation. Can the authors clarify the specific knowledge gap their study addresses?***
- ***The main research question/hypothesis is not clearly articulated. Could this be stated more directly?***

3. Methods and Materials

- ***The methodology lacks detail on replicates, controls, and statistical handling. How were the samples randomized, and was the analysis repeated to ensure reproducibility?***
- ***Can the authors clarify whether relevant standards or guidelines were followed in sample preparation and analysis?***
- ***Was any calibration or validation undertaken for the UV-Vis spectrometer measurements?***

4. Results and Discussion

- ***The results section combines interpretation with data presentation, which can be confusing. Could the authors separate these two elements for clarity?***
- ***Figures 1–3 are referenced but not described in sufficient detail. Are the axes labeled clearly, and are error bars/statistics reported?***
- ***How do the observed deviations from Beer-Lambert law compare with previous reports? Could the possible mechanisms be explained more deeply using current literature?***

5. Images/Figures

- ***Several figures are missing captions or have insufficient legends. Can the authors ensure each figure is self-explanatory, with complete annotation?***

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- ***Are the figures provided in sufficient resolution for both print and digital formats?***

6. Discussion

- ***The discussion mainly reiterates the results and lacks critical comparison with similar studies. Can the authors better contextualize their findings and discuss their significance and limitations?***
- ***How might environmental factors beyond Fe3O4 influence PSMP degradation? Addressing the broader applicability would strengthen the impact.***

7. Conclusion

- ***The conclusion should more clearly articulate the main discoveries and their implications. Could the authors summarize key insights and practical recommendations?***
- ***Recommendations for future research are broad; can the authors specify which experimental variables or real-world conditions should be prioritized?***

8. References

- ***There are inconsistencies in citation style, and some references lack complete information. Are all references formatted according to IJAR requirements and up to date?***
- ***Can the authors ensure all key recent studies on microplastic-heavy metal interactions are cited?***

9. Organization and Language

- ***The manuscript has grammatical errors and wordiness in several sections. Could the authors thoroughly proofread the text and consider language editing?***
- ***The logical flow between sections can be improved. Are all transitions smooth and headings/subheadings appropriately used?***

Minor Comments

1. Abstract:

- ***Avoid redundancy (e.g., repeating 'research research'); revise for concise language.***

2. Introduction:

- ***Ensure all technical terms and acronyms (e.g., MPs, PSMPs) are defined upon first mention.***

3. Methods and Materials:

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- ***Provide catalog or batch numbers for all materials used for reproducibility.***

4. Methods and Materials:

- ***Specify temperature and environmental controls during experiments.***

5. Results:

- ***Verify that all units (g/L, nm, cm^{-1}) are consistent and correct throughout figures and tables.***

6. Figures:

- ***Check that all legends include sample sizes and statistical information where relevant.***

7. Discussion:

- ***Avoid speculative statements unless clearly separated from evidence-based findings.***

8. References:

- ***Ensure all cited works in the text appear in the reference list and vice versa; double-check DOIs and titles for accuracy.***