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| Book Name: | **Plasmas Afterglows with N2 for Surface Treatments synthesis 2024** |
| Manuscript Number: | **Ms\_BPR\_3686.24** |
| Title of the Manuscript:  | **Plasmalyse – A Plasma Sterilization Prototype** |
| Type of the Article | **Book chapter** |

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| PART 1: Review Comments |
| Compulsory REVISION comments | Reviewer’s comment | Author’s Feedback*(Please correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)* |
| **Please write a few sentences regarding the importance of this manuscript for the scientific community. Why do you like (or dislike) this manuscript? A minimumof 3-4 sentences may be required for this part.** | **This manuscript is significant for the scientific community as it presents an innovative plasma-based sterilization prototype, *Plasmalyse*, which addresses critical challenges in medical sterilization, particularly for heat-sensitive instruments. Its ability to achieve efficient sterilization at lower temperatures and shorter times compared to conventional autoclaves has far-reaching implications for improving healthcare practices. The manuscript also contributes valuable insights into N-atom transmission and its role in sterilization, offering a foundation for further research in plasma technology. I appreciate the manuscript for its practical focus, clear methodology, and scalability of the proposed solution, although it could benefit from a deeper discussion of challenges and broader comparisons with existing technologies.** |  |
| **Is the title of the article suitable?****(If not please suggest an alternative title)** | The title "Plasmalyse – A Plasma Sterilization Prototype" is suitable, but it could be made more descriptive to better reflect the manuscript's focus on both the technological development and the specific applications of the plasma sterilization system. **"Plasmalyse: A Novel Plasma Sterilization System for Medical and Dental Applications"** **"Development and Application of Plasmalyse: A Plasma Sterilizer for Heat-Sensitive Medical Instruments"** **"Plasmalyse: Efficient Plasma Sterilization of Medical Instruments at Low Temperatures"** |  |
| 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. | **Revised Abstract Example:****This study introduces *Plasmalyse*, a cost-effective plasma sterilization system designed for medical and dental instruments. By utilizing a microwave source from a commercial oven and a modified vacuum pump, *Plasmalyse* achieved a 6-log reduction of spores in 7 minutes at 100°C and 120 minutes at 30°C, significantly faster than conventional autoclaves, which take 40 minutes at 105°C. The system's ability to sterilize at lower temperatures (as low as 60°C) is ideal for temperature-sensitive instruments, while using N₂ gas helps avoid oxidation. The system's scalability was demonstrated through its adaptation for hospital applications with a 135-liter reactor, achieving similar sterilization results in a fraction of the time compared to traditional methods. Additionally, the study explores the transmission of nitrogen atoms through hollow tubes, relevant for sterilizing endoscopic equipment.****This revised version incorporates clearer details, comparisons with existing methods, and emphasizes the practical significance of the technology.** |  |
| **Are subsections and structure of the manuscript appropriate?** | **The manuscript's structure appears appropriate for its content, with a clear progression from the introduction and methodology to experimental setup, results, and conclusions. However, a few improvements could enhance the flow and readability:****Strengths of the Structure:**1. **Logical Flow: The manuscript follows a logical progression, from introducing the concept of *Plasmalyse* and its initial dental applications to expanding it for hospital use. Each section builds on the previous one, providing a clear narrative of development and results.**
2. **Clear Sections: The sections are well-defined, and the inclusion of subsections like "The Laplace Setup," "Plasmalyse Setup for Sterilization of Dental Instruments," and "Plasmalyse for Hospital Applications" help readers navigate through the various stages and applications of the research.**
3. **Methodology and Results Segmentation: The manuscript appropriately separates the methodology (e.g., experimental setup) from the results, making it easier to understand the experimental design and then follow the findings.**

**Suggestions for Improvement:**1. **Subsection Titles:**
	* **Some subsection titles could be slightly more descriptive to improve clarity. For example, "The Laplace Setup" might be renamed to "Experimental Setup at Laplace Lab" to immediately indicate that it's about the experimental design.**
	* **Additionally, the section "Plasmalyse for Sterilization in the Hospital" could be expanded to include the context of how the reactor design differs or improves upon the dental application.**
2. **Introduction and Background:**
	* **The introduction could benefit from more context or background regarding the need for alternatives to autoclaves, highlighting the limitations of traditional sterilization methods, such as high temperature and long sterilization times. A clear description of the "problem" and the "solution" could better frame the study for readers.**
3. **Discussion and Conclusion:**
	* **The discussion could benefit from a more detailed comparison between the *Plasmalyse* system and other plasma sterilization technologies, as well as conventional sterilization methods like autoclaving. This would give readers more insight into where *Plasmalyse* stands in the broader context of sterilization technologies.**
	* **The conclusion section should summarize the key findings more succinctly, emphasizing the potential impact on future sterilization applications, especially in hospital and dental environments.**
4. **Integration of Results:**
	* **Some results (e.g., N-atom transmission) could be better integrated into the discussion of the experimental setups and not presented separately in isolated sections. This would make the narrative smoother and avoid too much fragmentation of related findings.**

**Overall Assessment:****The structure of the manuscript is generally well-organized and appropriate for the content. With adjustments to improve clarity and enhance the flow, the manuscript will be even more accessible to a wider audience, allowing the research findings to be more easily understood in the context of plasma sterilization technologies.** |  |
| **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 minimumof 3-4 sentences may be required for this part.** | **This manuscript is scientifically robust and technically sound due to its rigorous experimental design and thorough methodology. The authors employ well-established techniques such as Optical Emission Spectroscopy (OES) and NO titration to measure nitrogen atom densities, ensuring the accuracy of the results. The use of commercially available components, such as the microwave source and vacuum pump, demonstrates the practicality and scalability of the *Plasmalyse* system. Additionally, the manuscript provides clear comparisons with existing sterilization methods, such as autoclaving, and presents convincing results showing faster and lower-temperature sterilization, further reinforcing the scientific validity and potential impact of this technology.** |  |
| **Are the references sufficient and recent? If you have suggestions of additional references, please mention them in the review form.****-** | **yes** |  |
| Minor REVISION commentsIs the language/English quality of the article suitable for scholarly communications? | yes |  |
| Optional/Generalcomments | This manuscript provides a robust and innovative exploration of plasma sterilization technology. The results are promising, and the potential for *Plasmalyse* to revolutionize medical sterilization is evident. With some refinements in presentation and additional analysis, the paper will make a significant contribution to the field of plasma applications in healthcare. |  |

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| **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)* |  |

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| **Reviewer Details:** |
| Name: | **Saba Zafar** |
| Department, University & Country | **National Center for Physics, Pakistan** |