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| Book Name: | **Plasmas Afterglows with N2 for Surface Treatments synthesis 2024** |
| Manuscript Number: | **Ms\_BPR\_3686.14** |
| Title of the Manuscript: | **Determination of N and O-atoms, of N2(A) and N2 (X,v>13) Metastable Molecules and N2+ Ion Densities in the Afterglows of N2-H2, Ar-N2-H2 and Ar-N2-O2 Microwave Discharges** |
| Type of the Article | **Complete 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 minimum of 3-4 sentences may be required for this part.** | * Significance:   1. The manuscript provides precise measurements of active species (N and O atoms, metastable molecules, and ions) in plasma afterglows, enhancing the understanding of plasma behavior.   2. It has practical applications in fields like sterilization and surface treatment, where plasma processes play a crucial role. * Strengths:   1. Detailed experimental setup and calibration methodologies ensure accuracy and reproducibility of results.   2. Comparative analysis of gas mixtures (N2-H2, Ar-N2-H2, and Ar-N2-O2) offers insights into optimizing plasma conditions for specific applications. * Weakness:   1. The technical density of the content may limit accessibility for non-specialists, potentially requiring simplification for a broader audience. * Overall:   1. A valuable contribution to plasma physics with both theoretical and practical relevance. |  |
| **Is the title of the article suitable?**  **(If not please suggest an alternative title)** | Suggested Titles : 1. Characterization of Active Species in Microwave Discharge Afterglows of N₂-H₂, Ar-N₂-H₂, and Ar-N₂-O₂ Gas Mixtures  2. Analysis of N and O Atoms and Metastable Species in Plasma Afterglows of N₂-Based Gas Mixtures  3. Active Species Dynamics in N₂-H₂, Ar-N₂-H₂, and Ar-N₂-O₂ Microwave Plasma Afterglows |  |
| 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. | **Additions:**   1. **Objective**: Clearly state the primary aim of the research at the beginning, e.g., "This study aims to analyze active species in plasma afterglows to optimize conditions for applications like sterilization." 2. **Key Findings**: Highlight specific numerical results or trends, such as changes in N and O atom densities across gas mixtures, to make the abstract more result-oriented. 3. **Implications**: Briefly mention the practical relevance of the findings, such as their role in improving sterilization efficiency or surface treatment processes.   **Deletions:**   1. Remove overly technical details (e.g., exact calibration methods or band intensities) that may overwhelm the reader in the abstract. Such details are better suited for the main body.   **Example Revised Abstract:**  This study investigates the densities of active species, including N and O atoms, N₂(A), N₂(X, v > 13) metastable molecules, and N₂⁺ ions, in the afterglows of N₂-H₂, Ar-N₂-H₂, and Ar-N₂-O₂ microwave discharges. Optical emission spectroscopy and NO titration methods were used for precise calibration. The results reveal significant variations in active species densities across different gas mixtures, providing insights into optimizing plasma conditions. These findings have practical implications for applications such as sterilization and surface treatments. |  |
| **Are subsections and structure of the manuscript appropriate?** | Yes |  |
| **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.** | * Scientific Robustness: The manuscript demonstrates scientific rigor by employing established methodologies such as optical emission spectroscopy and NO titration to accurately measure active species densities in plasma afterglows. * Experimental Design: The experimental setup and calibration processes are well-documented, ensuring reproducibility and reliability of the results. * Data Analysis: The manuscript incorporates detailed equations and rate coefficients to explain the kinetics of the reactions, supporting the validity of the findings. * Comparative Approach: By comparing N₂-H₂, Ar-N₂-H₂, and Ar-N₂-O₂ gas mixtures, the study provides comprehensive insights into plasma dynamics under different conditions, adding to its technical soundness. |  |
| **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? | The language quality of the article is generally suitable for scholarly communication. |  |
| Optional/General comments |  |  |

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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)*** |  |
| **Reviewer Details:** | | | | |
| **Name:** | **Vyomesh Buch** | | | |
| **Department, University & Country** | **Parul University, India** | | | |