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| Book Name: | **Plasmas Afterglows with N2 for Surface Treatments synthesis 2024** |
| Manuscript Number: | **Ms\_BPR\_3686.16** |
| Title of the Manuscript:  | **Density of N2 Active Species in N2 –xCH4 Afterglows with x= (0-7.5)10-4 by Mass Spectrometry and Optical Spectroscopy at Low Gas Pressure** |
| 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.** | This manuscript is important for the scientific community as it provides detailed insights into the behavior of nitrogen plasmas in different afterglow states, advancing the understanding of plasma chemistry and dynamics. The use of multiple diagnostic methods, such as mass spectrometry, NO titration, and optical spectroscopy, ensures a comprehensive analysis and highlights the potential discrepancies between techniques, which is valuable for improving measurement accuracy. The investigation of the interplay between N and C atoms, particularly with the addition of CH4CH4 , offers practical implications for tailoring plasma processes in material synthesis and environmental applications. I appreciate the manuscript for its rigorous approach and the depth of its findings, though additional discussion on broader applications or implications would further enhance its impact. |  |
| **Is the title of the article suitable?****(If not please suggest an alternative title)** | **Yes** |  |
| 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. | **Yes** |  |
| **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.** | This manuscript is scientifically robust and technically sound due to its systematic use of advanced diagnostic tools to study plasma properties. The combination of mass spectrometry, NO titration, and optical spectroscopy ensures a multifaceted analysis, allowing for cross-validation of findings and highlighting measurement discrepancies, such as the 50% higher N-atom density reported by NO titration. The detailed quantification of metastable and radiative states of N2N2 and N2+N2+ , as well as the careful distinction between pink and late afterglows, demonstrates a high level of technical precision. Additionally, the study effectively links plasma chemistry to experimental conditions, such as the introduction of CH4CH4 , offering both fundamental insights and practical relevance. |  |
| **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/General comments | 1. This manuscript provides a thorough and detailed investigation of nitrogen plasmas, utilizing multiple diagnostic techniques to offer robust and reliable insights into afterglow behaviors and plasma chemistry.2. The findings, particularly the comparison of diagnostic methods and the interplay between N-atom and C-atom densities, hold significant value for advancing both theoretical and applied plasma research.3. The work is well-structured and scientifically sound, though further discussion on the broader implications of the results in industrial or environmental contexts could enhance its relevance and impact. |  |

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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: | **Anitha Rexalin Devaraj** |
| Department, University & Country | **AMET Deemed to be University, India** |