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| Book Name: | **Plasmas Afterglows with N2 for Surface Treatments synthesis 2024** |
| Manuscript Number: | **Ms\_BPR\_** **3686.8** |
| Title of the Manuscript:  | **Electron and Vibrational Distributions in N2 Flowing Discharges and Postdischarges at Reduced Gas Pressure** |
| 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 minimum of 3-4 sentences may be required for this part.** | **The manuscript is particularly noteworthy for its detailed examination of the vibrational temperature evolution in both the discharge and post-discharge regions. The observation that high vibrational levels become overpopulated in the post-discharge as low vibrational level populations decrease is a significant finding that contributes to our understanding of energy redistribution in plasma systems. Furthermore, the study's focus on the importance of N2(X,v) ground state levels in N2 flowing afterglows for re-ionization and excitation of radiative states highlights the critical role of vibrational excitation in plasma processes.** |  |
| **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 demonstrates scientific robustness and technical soundness through several key aspects:**1. **Comprehensive approach: The study combines theoretical modeling with experimental measurements, providing a well-rounded investigation of electron and vibrational excitation in N2 plasmas. This dual approach allows for validation of theoretical predictions and enhances the reliability of the results.**
2. **Experimental rigor: The experimental setup is well-designed, utilizing a long DC discharge with a homogeneous positive column. This setup enables accurate diagnostics and measurements of crucial plasma parameters such as electric field, electron density, and gas temperature. The use of multiple diagnostic techniques, including electrostatic probes, microwave cavity measurements, and optical spectroscopy, ensures a thorough characterization of the plasma.**
3. **Advanced diagnostic techniques: The study employs Coherent Anti-Stokes Raman Spectroscopy (CARS) for measuring N2(X,v) vibrational density, which is a sophisticated and highly sensitive technique for probing molecular vibrations. This demonstrates the use of state-of-the-art methods in the research.**
4. **Theoretical foundation: The manuscript describes a detailed theoretical approach, solving a system of vibrational master equations coupled to the Boltzmann equation for the electron energy distribution. This comprehensive modeling provides a solid theoretical basis for understanding the complex processes occurring in the plasma.**
5. **Consistency with established knowledge: The study builds upon and references previous work in the field, as evidenced by the citation discussing the importance of N2(X,v) ground state levels in N2 flowing afterglows. This demonstrates that the research is grounded in established scientific understanding while advancing new insights.**

**These factors collectively contribute to the scientific correctness and technical soundness of the manuscript, making it a valuable contribution to the field of plasma physics and chemistry.** |  |
| **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 |  |  |

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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:** | **Somarouthu V G V A Prasad** |
| **Department, University & Country** | **Pithapur Rajah”S Government College(A), India** |