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| Book Name: | **Plasmas Afterglows with N2 for Surface Treatments synthesis 2024** |
| Manuscript Number: | **Ms\_BPR\_3686.5** |
| Title of the Manuscript: | **N and C-atoms in R (Ar)-N2-CH4 Flowing Afterglows in High Power RF Jet** |
| 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 contains interesting experimental results on the investigation of impurities in an inductively coupled argon plasma. The analytical results were obtained with two Czerny-Turner spectrometers connected in series. These spectrometers are an efficient and cost-effective alternative to conventional analytical devices. In this respect, the manuscript is a valuable and appropriate addition to the previously published results in this field. |  |
| **Is the title of the article suitable?**  **(If not please suggest an alternative title)** | The title misled me. At the latest when reading the summary, it becomes clear that it is about more atoms than just C and N. When reading the rest of the text, it turns out that microwave discharges are also discussed. An alternative title for me would therefore be, for example, “Analysis of gaseous impurities in argon plasma discharges and microwave post-discharges”. |  |
| 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. | In his introduction, the author writes: “The objective of this work is to analyze by emission spectroscopy the transient radiative species which are produced in an Ar RF plasma torch with addition of a few H2, CH4 and CF4 polluting gases.” He could use this as a guideline for his abstract and structure it accordingly. For example, in the following order:  motivation,  results regarding the argon plasma from atomic emission spectroscopy and molecular spectroscopy,  results regarding the microwave afterdischarge from molecular spectroscopy. |  |
| **Are subsections and structure of the manuscript appropriate?** | In some places, the chapters of this manuscript seem to have been pulled out of context.  For me as a reader, the introduction is far too brief. In particular, I miss an overview of the current state of research and a concrete indication of why the named molecules are the subject of the study.  In the experimental section, I would like to see more detailed explanations, for example of the equipment used with the additions “for atomic spectroscopy”, “for vibrational and rotational spectroscopy”, “for gas chromatography”. A brief description of the chemicals used and their degree of purity would also satisfy my curiosity.  In chapter 5.3, an individual discussion of the results for impurities with CF4 and CH4 and then a comparative comparison would be helpful. The associated Figure 5.2 is not very informative and could, like the other figures, be revised in terms of quality.  For chapters 5.3 and 5.4, a supplementary overview of the dissociation reactions and the respective excitation states could be helpful, as well as an explanatory or supplementary sentence explaining why something is being discussed, for example a Boltzmann distribution.  I would introduce chapter 5.5 with a brief explanation of the purpose of the post-discharge process.  If some detailed information is removed from the first paragraph in chapter 5.6, it will read more smoothly. This also applies to some other passages in the manuscript where abstraction takes the reader further than detailed information.  Chapter 5.7 only seems to draw a conclusion from one section of the manuscript.  For a consistent listing of references, I recommend using a free citation software, for example Zotero. |  |
| **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.** | The manuscript is not yet fully developed, but represents a promising approach with a solid foundation. Less detailed information, more meta-information and, above all, more literature references and technical contexts could make it a valuable book contribution. Perhaps an indication of commercial use is also possible. |  |
| **Are the references sufficient and recent? If you have suggestions of additional references, please mention them in the review form.**  **-** | There are only four literature citations from the years 1950, 1991, 1995 and 2020. The manuscript would benefit significantly from further references. During a quick search on the internet, I found the following two articles:  Evaluate the argon plasma jet parameters by optical emission spectroscopy, <https://doi.org/10.1016/j.kjs.2023.03.001>  Characterization of an RF-driven argon plasma at atmospheric pressure using broadband absorption and optical emission spectroscopy  <https://doi.org/10.1063/5.0035488> |  |
| Minor REVISION commentsIs the language/English quality of the article suitable for scholarly communications? | The English of the article is mostly understandable. |  |
| Optional/General comments | The author regularly omits the multiplication sign when notating powers of ten, for example in the abstract for the number 3\*10-2. In some places, careless errors have crept in, for example in some of the spaces between numbers and units. |  |

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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:** | **Detlev Fuchtenbusch** |
| **Department, University & Country** | **Germany** |