**Reply to Reviewer 1**

The article: «Influence of nanoparticles and metal vapors on the color of laboratory and atmospheric discharges»

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***Comments to the Authors***

The article is devoted to the study of the influence of nanoparticles and metal vapors on the color of laboratory and atmospheric plasma discharges.

The article may be of interest, but for researchers in the field of plasma physics and gas discharges. Of course, the article discusses the effect of particles, including possibly nanoparticles, on the discharge glow, but the article is not suitable for the journal's topics.

Reply:

The manuscript has been revised. Several references was added. We hope that the results presented in the article will also be of interest to researchers who deal with micro and nanoparticles in traditional areas of nanomaterial physics [1-8]. Edits in the text are highlighted in either yellow or red font.

In addition, there are comments on the research methodology and interpretation of research on the article itself. Here are some of them:

1) Of course, metal vapors, nano- and micro-particles can affect the characteristics of the discharge. This is known from numerous studies of simpler and more understandable plasma objects such as glow discharge and arc. Similar studies and comparisons with known experimental data could be carried out on these objects. In this connection, the use of high-voltage pulse discharges is not justified. The authors draw an analogy with the formation of sprites, then, in my opinion, the study would be more suitable for another journal related, for example, atmospheric research.

Reply:

Our studies have shown that the effect of metal vapors on the color of the discharge plasma is much greater in the case of a pulsed breakdown in a nonuniform electric field. This made it possible to compare with the color of various discharges occurring in the upper atmosphere (Figure 1 in the text of the article). Even with well-studied discharges, it is very difficult to obtain such results. Thus, during an arc discharge, although there is a strong evaporation of the electrodes and the ejection of particles of various sizes, the voltage across the gap is low and the discharge in metal vapors outside the high-temperature arc channel is practically absent. Under these conditions, broadband Planck radiation from the arc channel plasma is observed. In a glow discharge, the sputtering of the electrodes has a low rate, and the emission spectra of the plasma of such discharges contain atomic and molecular transitions of the gases used. In the investigated mode, metal vapors are produced and excited by a pulsed discharge.

2) The article is more descriptive in nature, there is no explanation of physical laws, but which are misleading readers. For instance:

Lines 168, 169

*"An increase in the track brightness is apparently determined by an increase in the particle charge and size due to the evaporation of metal from the surface."*

One can agree with the influence of the particle size on the track size, but how can an increase in the particle charge affect the track glow?

Reply:

This judgment was removed from the text of the manuscript.

Lines 173-175

*«Based on the brightness of the track glow, the plasma concentration at the particle surface increases with distance from the cathode.»*

Again, it is not clear how the plasma density on the particle surface can affect the brightness of the track glow.

Reply:

Plasma concentration discussions have been removed from the text because no such measurements have been made. The nature of the glow of the particles in Figure 3 corresponds to the glow of a micrometeorite that burns down in the Earth's atmosphere [13] and [http://galaxy.astron.kharkov.ua/statti/meteor.htm]. The brightness of the micrometeorite (the particle) glow increases towards the track’s end. This cannot be explained by an increase in the particle velocity, since the particle stops. This occurs after the voltage pulse action. We believe that an increase in the ra-diation intensity of the particle is due to its heating during deceleration on gas particles. The text of the article has been revised.

Such inaccuracies are found throughout the text.

In this regard, I would recommend that the authors revise the article (taking into account their colossal authority in the scientific community and the possibility of conducting more thorough experimental research) and send the article to a more specialized journal.

Reply:

The text of the article was finalized and the English was improved.

We hope for a positive decision regarding the publication of this article in this journal.

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