

Metal-containing plasma source based on atmospheric pressure glow discharge

K. P. Savkin¹, D. A. Sorokin¹, D. V. Beloplotov¹, M. V. Shandrikov¹ and A. V. Kazakov^{1,2}

¹ Institute of High Current Electronics SB RAS
2/3 Akademicheskii Ave., Tomsk, 634055, Russia
E-mail: savkin@opee.hcei.tsc.ru

² Tomsk State University of Control systems and Radioelectronics
40 Lenin Ave., Tomsk, 634050, Russia

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Upgraded plasma source based on atmospheric pressure glow discharge and features of its operation are presented. The main purpose of upgraded device is generation of metal-contained plasma flows. A brief review of the state-of-the-art methods for generating metal-containing plasma at atmospheric pressure is given. The possibilities of application of the described discharge system in research on the production of ultrafine powders and functional coatings are indicated.

Keywords: atmospheric pressure, low-temperature plasma, metal atoms, metal ions, optical spectroscopy, ultrafine powders, coatings.

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REFERENCES

1. F. Maggi and F. Zadra, Propellants Explos. Pyrotech. **45**, 724 (2020).
2. E. Ringe, J. Phys. Chem. C **124**, 15665 (2020).
3. J. C. Pickering, A. P. Thorne and J. K. Webb, Mon. Not. R. Astron. Soc. **300**, 131 (1998).
4. T. Kawai, Y. Yamakawa and Y. Takahashi, Atmosphere **12**, 586 (2021).
5. G. Balducci, L. B. Diaz and D. H. Gregory, **19**, 60677 (2017).
6. T. V. Pfeiffer, J. Feng and A. Schmidt-Ott, Adv. Powder Tech. **25**, 56 (2014).
7. I. G. Gonzalez-Martinez, A. Bachmatiuk, V. Bezugly, J. Kunstmann, T. Gemming, Z. Liu, G. Cunibert and M. H. Rümmeli, Nanoscale **8**, 11340 (2016).
8. Z. C. Deng, X. X. Pang, X. C. Ding, L. Z. Chu, X. D. Meng and Y. L. Wang, Laser Part. Beams **38**, 54 (2020).
9. Yu. G. Morozov, O. V. Belousova, M. V. Kuznetsov, D. Ortega and I. P. Parkin, J. Mater. Chem. **22**, 11214 (2012).
10. Yu. A. Kotov, Nanotechnologies Russ. **4**, 415 (2009).
11. K. Bobzin, F. Ernst, K. Richardt, T. Schlaefer, C. Verpoort and G. Flores, Surf. Coat. Tech. **202**, 4438 (2008).
12. E. Hontanon, J. M. Palomares, M. Stein, X. Guo, R. Engeln, H. Nirschl and F. E. Kruis, J. Nanopart. Res. **15**, 1957 (2013).
13. K. P. Savkin, E. M. Oks, G. Yu. Yushkov and Yu. F. Ivanov, J. Appl. Phys. **127**, 213303 (2020).
14. K. P. Savkin, A. S. Bugaev, V. I. Gushenets, A. G. Nikolaev, Yu. F. Ivanov, E. M. Oks, V. P. Frolova, M. V. Shandrikov and G. Yu. Yushkov, Surf. Coat. Tech. **389**, 125578 (2020).
15. A. Kramida, Yu. Ralchenko, J. Reader and NIST ASD Team (2021). NIST Atomic Spectra Database (ver. 5.9), [Online]. Available: <https://physics.nist.gov/asd> [2022, July 13]. National Institute of Standards and Technology, Gaithersburg, MD. DOI: <https://doi.org/10.18434/T4W30F>.