PACS: 52.80.Mg

Operating time of nitrogen oxides in pulse-periodic diffuse discharge

V. S. Kurbanismailov[1], P. H. Omarova[1], G. B. Ragimkhanov[1], D. V. Tereshonok[2] and Z. R. Khalikova[1]

[1] Dagestan State University, Makhachkala
43-a Gadzhiyev st., Makhachkala, the Republic of Dagestan, 367000, Russia
E-mail: gb-r@mail.ru

[2] Joint Institute for High Temperatures of Russian Academy of Sciences
Bd. 2, 13 Izhorskaya st., Moscow, 125412, Russia

Received October 25, 2022

Numerical modeling of the production of nitrogen oxides NO and NO_2 in a repetitively pulsed mode in air at atmospheric pressure was performed for four different time dependences of the energy input power. The temporal dynamics of the temperature in the center of the discharge gap and the absolute number of particles of nitrogen oxides NO and NO_2 are shown. It has been found that the number of produced NO particles reaches a steady state almost immediately after the pulse stops, while the number of NO_2 particles continues to grow monotonically.

The research results may be in demand in the field of creating nitrogen oxide generators for medical applications.

Keywords: nitrogen oxides, diffuse discharge, gas dynamics, plasma chemistry.

DOI: 10.51368/1996-0948-2022-6-63-67

REFERENCES

1. S. M. Starikovskaia, J. Phys. D: Appl. Phys. **39**, R265 (2006).
2. A. Starikovskiya and N. Aleksandrov, Prog. Energy Combust Sci. **39**, 61 (2013).
3. Y. Ju and W. Sun, Prog. Energy Combust Sci. **48**, 21 (2015).
4. K. I. Almazova, A. N. Belonogov, V. V. Borovkov, V. S. Kurbanismailov, G. B. Ragimkhanov, A. A. Tren'kin, D. V. Tereshonok and Z. R. Khalikova, Tech. Phys. Lett. **47**, 71 (2021).
5. K. I. Almazova, A. N. Belonogov, V. V. Borovkov, V. S. Kurbanismailov, Z. R. Khalikova, G. B. Ragimkhanov, D. V. Tereshonok and A. A. Trenkin, EPL **130**, 65002 (2020).
6. K. I. Almazova, A. N. Belonogov, V. V. Borovkov, Z. R. Khalikova, G. B. Ragimkhanov, D. V. Tereshonok and A. A. Trenkin, Plasma Sources Sci. Technol. **30**, 095020 (2021).
7. V. V. Golub, A. S. Saveliev, V. A. Sechenov, E. E. Son and D. V. Tereshonok, High Temp. **48**, 903 (2010).
8. E. Son and D. Tereshonok, EPL **99**, 15002 (2012).
9. M. A. Malik, Plasma Chem. Plasma Process. **36**, 737 (2016).
10. S. N. Buranova, V. V. Gorokhova, V. I. Karelina, V. D. Selemir and A. S. Shirshin, Technical Physics **65** (5), 723 (2020).
11. N. Y. Babaeva, S. N. Buranov, G. V. Naidis, G. B. Ragimkhanov, V. D. Selemir, D. V. Tereshonok, A. A. Trenkin, Z. R. Khalikova and A. S. Shirshin, Plasma Phys. Rep. **48**, 11 (2022) [in Russian].
12. S. I. Gritsinin, V. Y. Knyazev, I. A. Kossyi and N. A. Popov, Plasma Phys. Rep. **32**, 520 (2006).