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Behavior of Atomic Nitrogen in Medium Pressure Short-gapped Discharge YUSUKE NAKAGAWA, TATSUKI YOSHII, SATOSHI UCHIDA, FUMIYOSHI TOCHIKUBO, Tokyo Metropolitan University — Atmospheric plasma is worth applying to various fields due to its high chemical reactivity and low temperature. However, the lifetime of the radicals produced in the atmospheric plasma is short and the plasma region is local. Under the pressure of several tens kPa, which we call medium pressure, it is supposed that both plasma uniformity and long radical lifetime can be achieved. In order to elucidate the behavior of radicals in the medium pressure plasma, we measured the atomic nitrogen density produced in short-gapped pulsed dielectric barrier discharge by TALIF spectroscopy. The atomic nitrogen measurement is conducted in 30, 50, and 100 kPa N2 discharge with 0.5 mm discharge gap. Under each pressure, atomic nitrogen increases in the afterglow until 500 - 1000 micro seconds, and thereafter begins to decrease. The absolute density of atomic nitrogen is estimated using the decay rate of the recombination reaction under the assumption of the gas temperature as 400 K. The results indicate that the atomic nitrogen flux becomes larger as the pressure decreases, and the maximum flux of atomic nitrogen at 30 kPa is about triple of that at 100 kPa. The streamer radius at 30 kPa is double of that at 100 kPa, which means that medium pressure discharge improves the plasma uniformity.

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