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Spatio-temporal distribution of atomic oxygen and ozone under pin-to-sphere oxygen discharge[1] YUSUKE NAKAGAWA, TAKUYA KAWAKITA, SATOSHI UCHIDA, FUMIYOSHI TOCHIKUBO, Tokyo Metropolitan University — Pure oxygen discharge is preferable for production of atomic oxygen and ozone, while there is a difficulty in measuring their local densities. The ozone density is typically measured by UV absorption, but its resolution is insufficient to measure the local ozone density in filamentary discharges. The atomic oxygen density can be measured by TALIF, but the ozone interference, which is the in-situ atomic oxygen production due to the ozone photo-dissociation, disturbs the measurement. In this study, we achieved simultaneous measurement of densities of atomic oxygen and ozone, by focusing on the laser intensity dependence of TALIF signals on them. Under pure oxygen needle-to-sphere pulsed barrier discharges, the atomic oxygen density near the needle anode was approximately 3 times larger than that near the spherical cathode with dielectric barrier. There appeared the decay of ozone after the rapid ozone production near the anode, whereas the ozone density near the cathode reached constant without decay. The results indicate that high atomic-oxygen-production efficiency can be obtained near the anode, whereas eventual ozone production near the cathode is superior to that near the anode. The difference in the ozone behavior is supposed to arise from thermal decomposition of ozone.

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