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Investigation of the Spatial Distribution Evolution of Electron Temperature in Capacitive Coupled Single- and Dual-Frequency RF Plasmas in Ar/O_2 mixture over the RF Period. S.G. BELOSTOTSKY, O.V. BRAGINSKY, A.S. KOVALEV, D.V. LOPAEV, T.V. RAKHIMOVA, A.N. VASILIEVA, Univ. of Houston — The emission spectroscopy was applied for studying the temporal-spatial behavior of capacitive coupled single- and dual-frequency (1.76 MHz + 81 MHz) rf plasmas. As observed in the low-pressure (< 100 mTorr) rf discharges, the intensity oxygen atom emission line O($3p^5P \rightarrow 3p^5S$) 777 nm is fully determined by the dissociative excitation of O_2 molecules with the ratio of O line to line Ar($2p_1 - 1s_2$) 750 nm being a linear function of electron temperature. It allowed us to investigate evolution of the axial distributions of electron temperature over the rf period by using the temporally and spatially resolved actinometry technique. It was experimentally realized by the ns-gated ICCD camera equipped objective with narrow-band interference filters and synchronized with the LF voltage. It is shown that the high-frequency (HF) rf discharge provides uniform spatial distribution of electron temperature in the inter-electrode gap. With adding LF power, the strong electron heating near the electrode sheaths occurs synchronously with the LF period. With increasing LF power the electron heating becomes stronger and penetrates more deeply inside the bulk of plasma. At r pressures $\leq$ 50 mTorr the electron temperature in the discharge center doesn't changes with applying LF power, but it isn't already so at the higher pressure that directly shows coupling two rf plasmas with increasing pressure.

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