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**Tailoring electron heating in rf capacitive discharges at atmospheric pressure**[1] SANGHOO PARK, WONHO CHOE, Korea Advanced Institute of Science and Technology, SE YOUN MOON, Chonbuk National University, JIAN JUN SHI, Donghua University — Over the several decades, the tailoring electron heating has been actively attempted to control the electron characteristics in ionized gases, but it has been tough to achieve the desired outcome due to its nonlinear nature. In this presentation, we report the electrical characteristics and electron information in single-frequency (4.52 MHz and 13.56 MHz) and dual-frequency (a combination of 4.52 MHz and 13.56 MHz) capacitive discharges in the abnormal $\alpha$-mode at atmospheric pressure. A continuum radiation-based electron diagnostic method is employed to estimate the electron density ($n_e$) and temperature ($T_e$). Our experimental observations reveal that time-averaged $n_e$ (7.7–14  $10^{11}$ cm$^{-3}$) and $T_e$ (1.75–2.5 eV) can be independently controlled in dual-frequency discharge, whereas such control is nontrivial in single-frequency discharges, which shows a linear increase in $n_e$ and little to no change in $T_e$ with increases in the rf input power. Furthermore, the two-dimensional spatiotemporal evolution of neutral bremsstrahlung and associated electron heating structures is demonstrated. These results reveal that a symmetric structure in electron heating becomes asymmetric (via a local suppression of electron temperature) as two-frequency power is simultaneously introduced.

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