Electron heating in capacitively coupled discharges and reactive gases

Gerhard Franz[a)]
Munich University of Applied Sciences, D-80335 Munich, Germany

Michael Klick[b)]
Advanced Semiconductor Instruments, D-12459 Berlin, Germany

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The effective collision frequency ν_{eff} of electrons in capacitively driven discharges of Ar/Kr, Cl_2 and BCl_3 has been investigated using self-excited electron resonance spectroscopy. The most prominent features are the steep increase of ν_{eff} at low power inputs in all three gases and a slight but systematic decrease of ν_{eff} versus p for Ar/Kr and BCl_3 over the whole pressure range investigated. At medium pressures, the effective collision rate ν_{eff} in Cl_2 increases by 2 orders of magnitude which is a clear manifestation for the transition from stochastic to ohmic heating. These features have been correlated with data gained with a $V(I)$ probe. The dependence of the ohmic discharge resistance is mainly determined by the drastic change of ν_{eff} rather than by the variation of electron density n_e. © *2005 American Vacuum Society.* [DOI: 10.1116/1.1947201]