

# Alpha and gamma RF capacitative discharges in N<sub>2</sub> at intermediate pressures

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Received 11 November 1986, in final form 29 July 1987

**Abstract.** Measurements have been made on the current and voltage characteristics and the time-resolved and time-averaged visible emission of alpha- ( $\alpha$ -) and gamma- ( $\gamma$ -) type RF capacitative discharges in N<sub>2</sub> at frequencies between 10 and 60 MHz over the pressure range 10 to 100 Torr. A time-dependent model is proposed for  $\alpha$ -type discharges that yields electron energy and density, internal potentials, discharge current and power dissipation given the measured parameters of inter-electrode voltage and separation, gas pressure and RF frequency. The model predicts considerable energy dissipation in the near electrode sheaths and elucidates the increasing stability of  $\alpha$  discharges for higher input powers as the RF frequency is raised.