

Temperature and pressure effects on the properties of positive streamers in air

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Temperature and pressure effects on the properties of positive streamers in air

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We present experimental results on how the properties of positive, pulsed streamers in air depend on E/N (in V/cm^2). Streamers are generated in a wire-cylinder reactor at constant voltage (so constant E). The density is changed either by varying the temperature (20-500 °C) at constant pressure (1000 mbar), or by varying the pressure (379-1000 mbar) at constant temperature (ambient temperature). A fast ICCD-camera (200 ps shutter-time) is used to analyze the spatial and temporal development of the streamers.

As an example, Fig. 1 shows the average streamer velocity as function of E/N . Increasing E/N results in higher energy-per-pulse and faster streamer development. A significant difference can be observed when changing the density by varying the temperature (black line), or by varying the pressure (grey line). The temperature effect is much more pronounced than the density effect. We will discuss these observations and compare them with findings in literature.

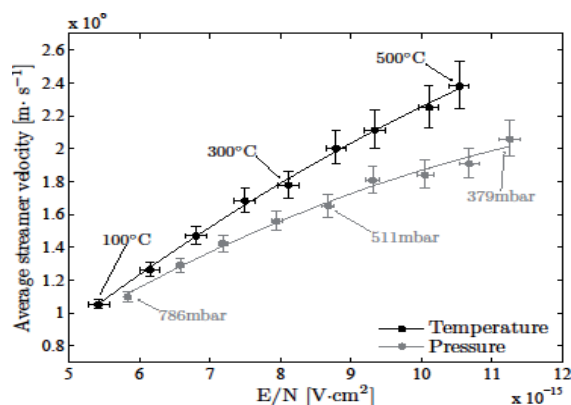


Fig. 1 Streamer velocity when varying E/N by temperature (black line) or by pressure (grey line)

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