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# Atmospheric Plasma Jets: The Effect of Electrode Materials

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Atmospheric plasma jets are important kind of future electric propulsion systems capable of operating in atmosphere at low altitudes. The phenomena responsible for generating plasmas and plasma jets at atmospheric pressures through pulsed atmospheric pressure streamers (PAPS) are well known, but the underlying formation and propagation mechanisms are not yet fully understood. This especially holds for electrode discharges at atmospheric pressures. For this reason, we studied plasma dynamics through sophisticated optical and imaging systems in order to detect and quantify small, but important diversities caused by electrode material properties. The moment of PAPS formation is extremely sensitive to the initial conditions, which are also related to intrinsic material properties such as work function. These properties can guide PAPS formation and propagation through the interplay of different processes occurring during both stages. In the case of presented results for copper and titanium, the difference in the work function (4.65 and 4.33, respectively) already leads to delay in PAPS formation for 1 μs (Ti precedes Cu). Furthermore, the PAPS propagation depends on voltage waveform and electric field along the propagation path. Interestingly PAPS speed profiles are independent of electrode material, whereas range and speed is determined by the discharge voltage at the emission of different electrons. Furthermore, the prospects of nano-size electrode and tailoring the PAPS formation conditions are discussed for scaling down and forming plasma jets at these conditions.