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Spatially-resolved Optical Emission Spectroscopy Measurements of Free Plasma Jets Formed off the Surface of a Piezoelectric Transformer[1] JINYU YANG, University of Notre Dame, SEONG-KYUN IM, University of Notre Dame and Korea University, DAVID GO, University of Notre Dame
— Spatially resolved optical emission spectroscopy (OES) was performed to characterize the chemical composition of a plasma jet originating from the surface of a piezoelectric transformer (PT). A PT is a non-centrosymmetric crystal that converts low-voltage AC input to high-voltage AC output through an innate electromechanical coupling. When a PT is actuated by input of ˜20 V_{rms}, high-voltage gain at the distal end can be several orders of magnitude, leading to a free plasma jet without flowing a guiding gas. In this work, spatially resolved OES measurements were conducted along the PT-driven plasma jet using a spectrometer with a wavelength resolution of 0.06 nm. Results reveal the chemical composition of the plasma jet and how it evolves as the jet extends into open air. Notably, as the jet propagates into the open air, the emission intensity of the nitrogen second positive system stays almost constant in the first 5 mm and then starts to decrease monotonically as the jet propagates away from the PT. The emission spectrum can still be observed until 15 mm from the PT's surface, which is comparable to many conventional plasma jets and the visible length of the free plasma jet.

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