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Stationary wave of microplasmas and its propagation in the array of microchannels JIN HOON CHO, PETER KIM, SUNG-JIN PARK, J. GARY EDEN, Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign — Propagation of a stationary wave of microplasmas in an array of microchannels has been observed in rare gases at atmospheric pressure, and investigated spatiotemporally. The microchannels, fabricated in a spiral geometry, have widths of 200-300 μm , and a length-to-width aspect ratio of $\sim 10^3:1$. The devices were powered with a 20 kHz sinusoid voltage and operated at 300 – 700 Torr in case of several rare gases. A gated, intensified camera and a telescope, with a frame resolution of ~ 50 ns reveal the formation of unique standing wave structures of microplasmas and the rapid propagation of the plasma structure radially outwards. The scale, spacing and propagation rate of the standing waves of microplasmas are dependent on the discharge gases, and the pressure. It is observed that the wave properties can be controlled by the device structure, and numerical analysis of the observed stationary waves along the azimuthal coordinate reveal a phase shift, oscillation and self-arrangement. The detailed characteristics of plasma wave propagation and these stationary waves will be discussed.

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