

DESIGN OF A COLD ATMOSPHERIC PLASMA JET GENERATOR

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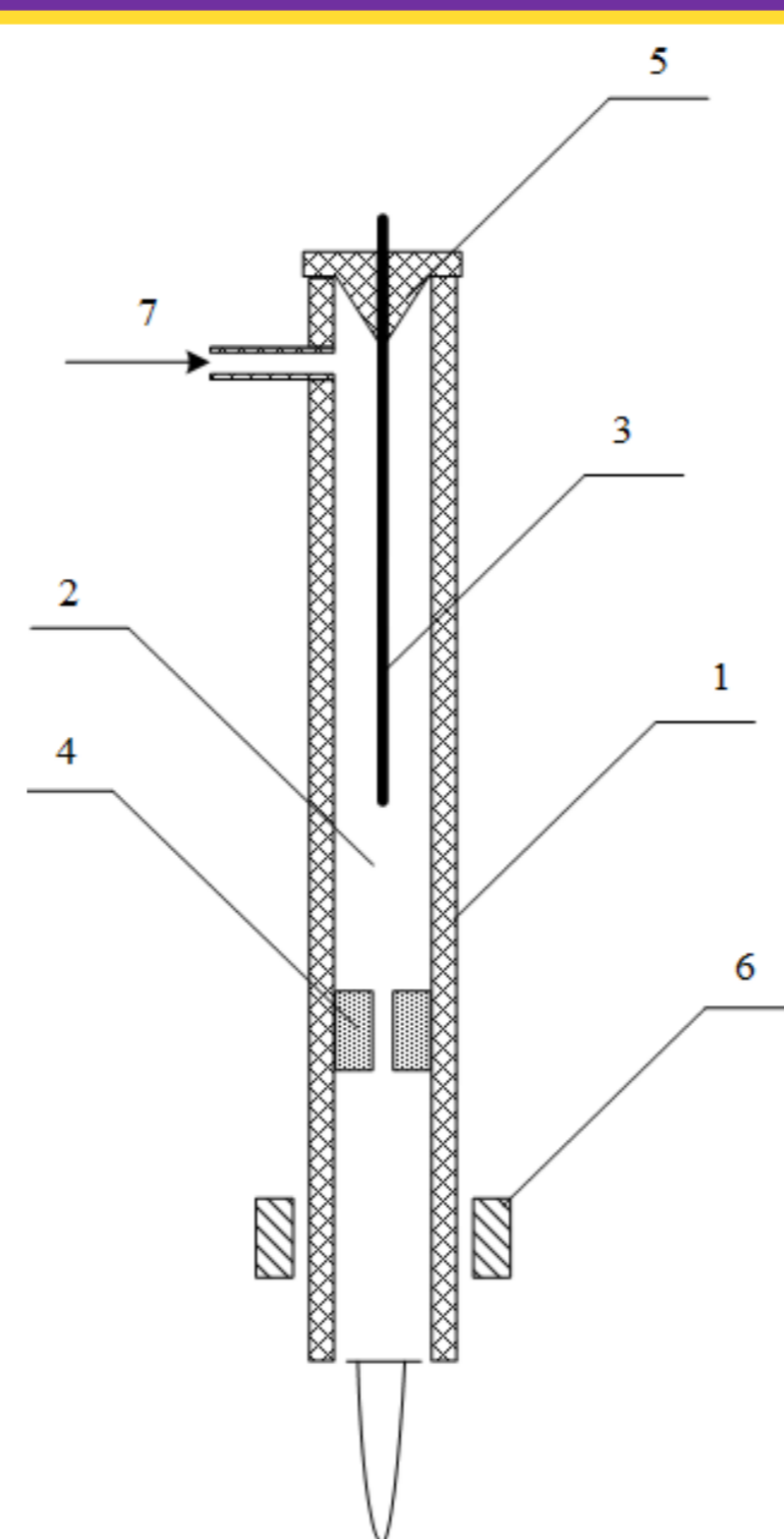
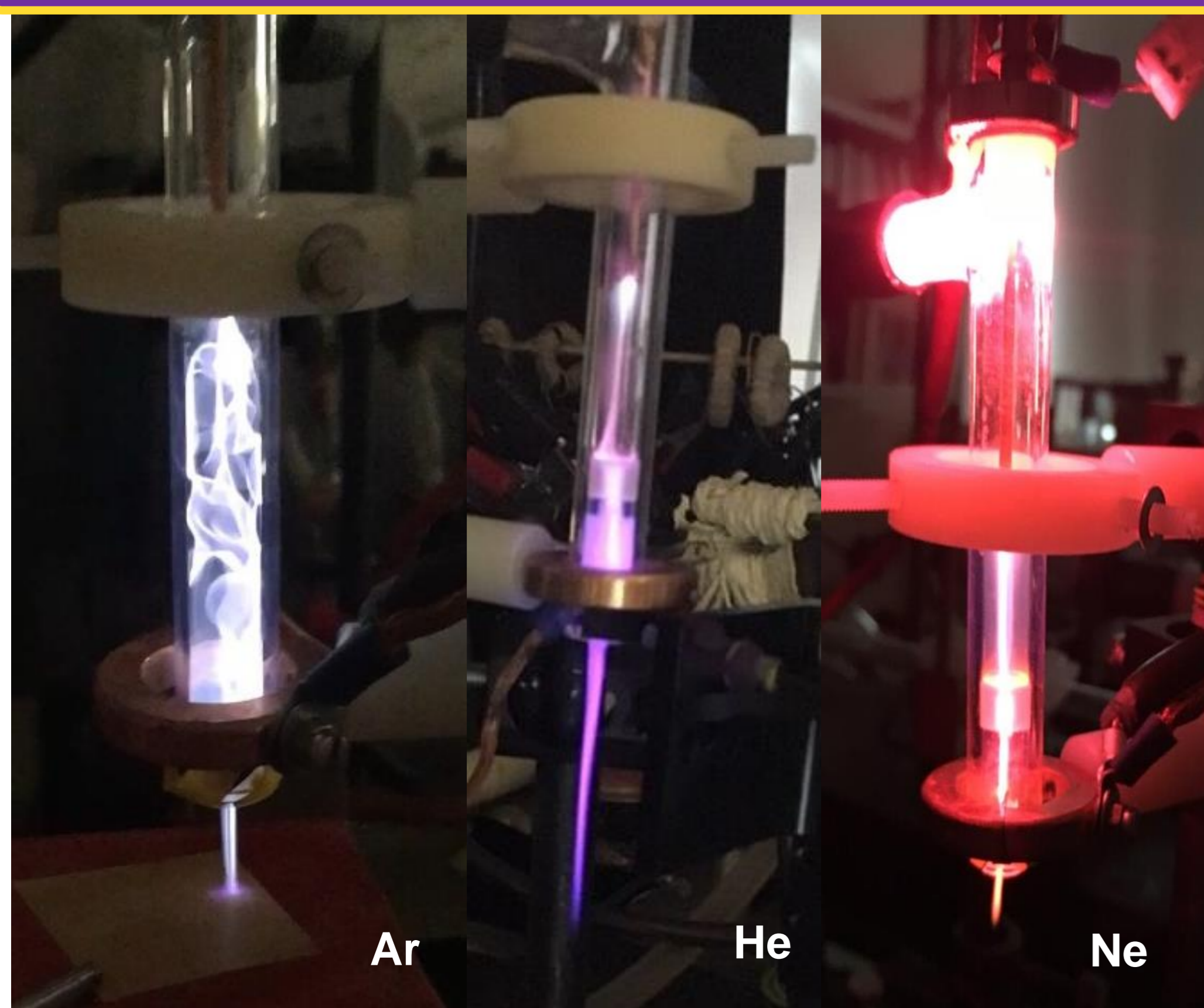
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Cold atmospheric plasma is a developing field of plasma medicine. The plasma temperature is 30-40 degrees and when exposed to a surface, it increases its temperature less than one degree. The plasma devices generate the streamer type of breakdown in a mixture of noble gases and air. The streamers propagate over a jet of a pumped through the dielectric tube noble gas. The goal of this research is the develop of gas-discharge cell design to increase the area of interact with object and the investigation of the cold atmospheric plasma jet generation.

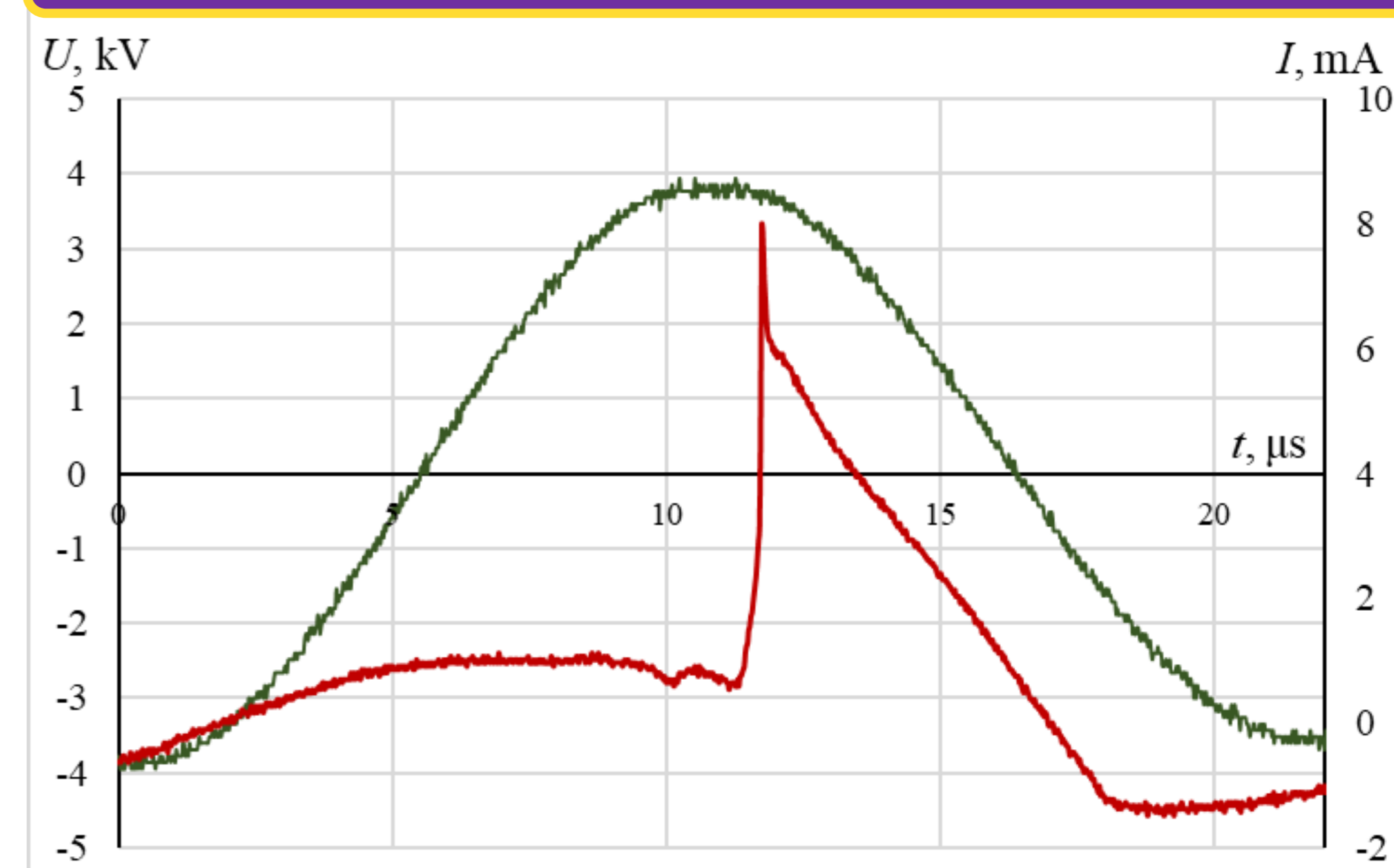
Coaxial device with various gases



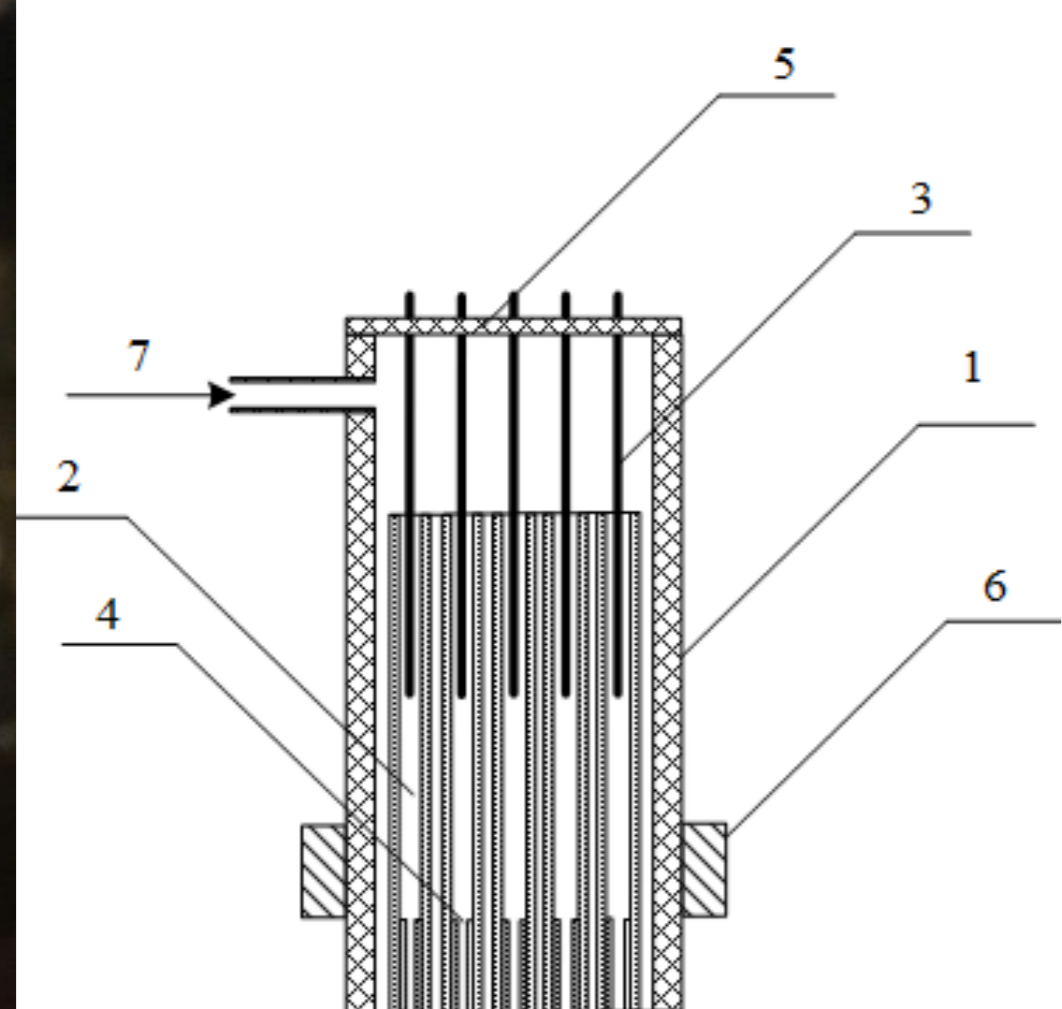
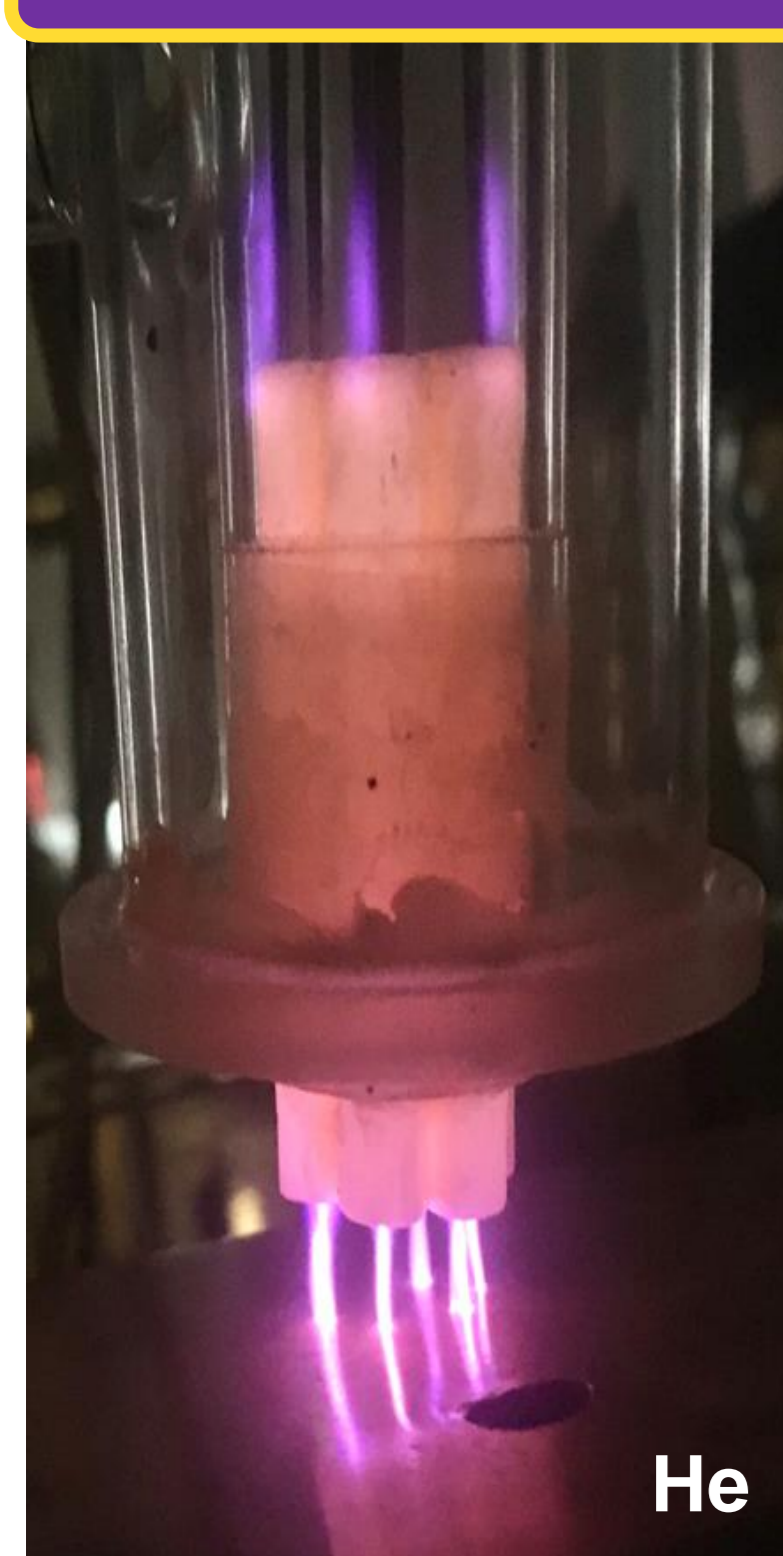
1 - quartz tube; 2 - discharge zone; 3 - powered electrode; 4 - capillary; 5 - insulator; 6 - grounded electrode; 7 - gas.

Plasma jet generation was investigated using sinusoidal excitation and excitation by rectangular positive pulses.

Oscillogram of plasma jet sinusoidal excitation

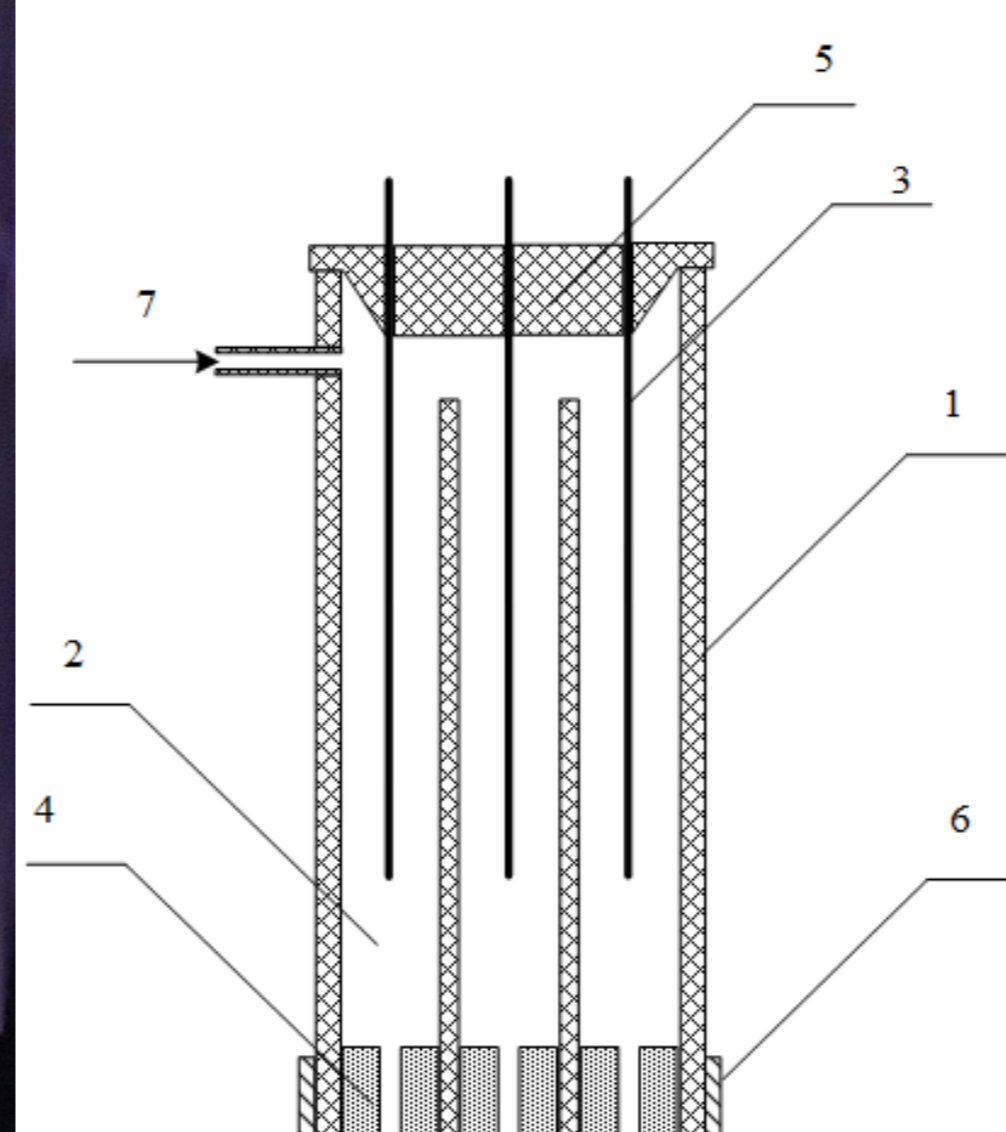
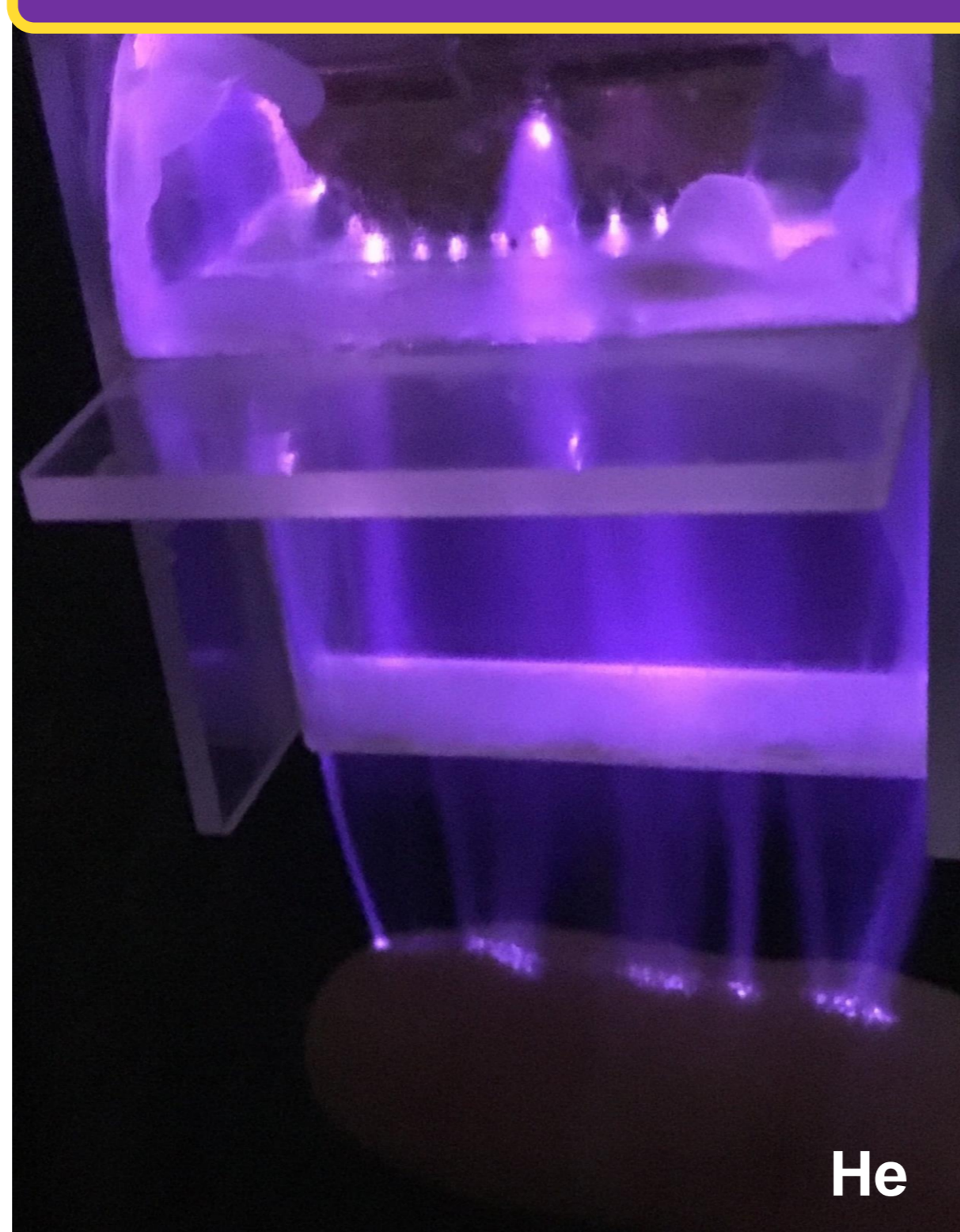


Device with 7 dielectric coaxial channels



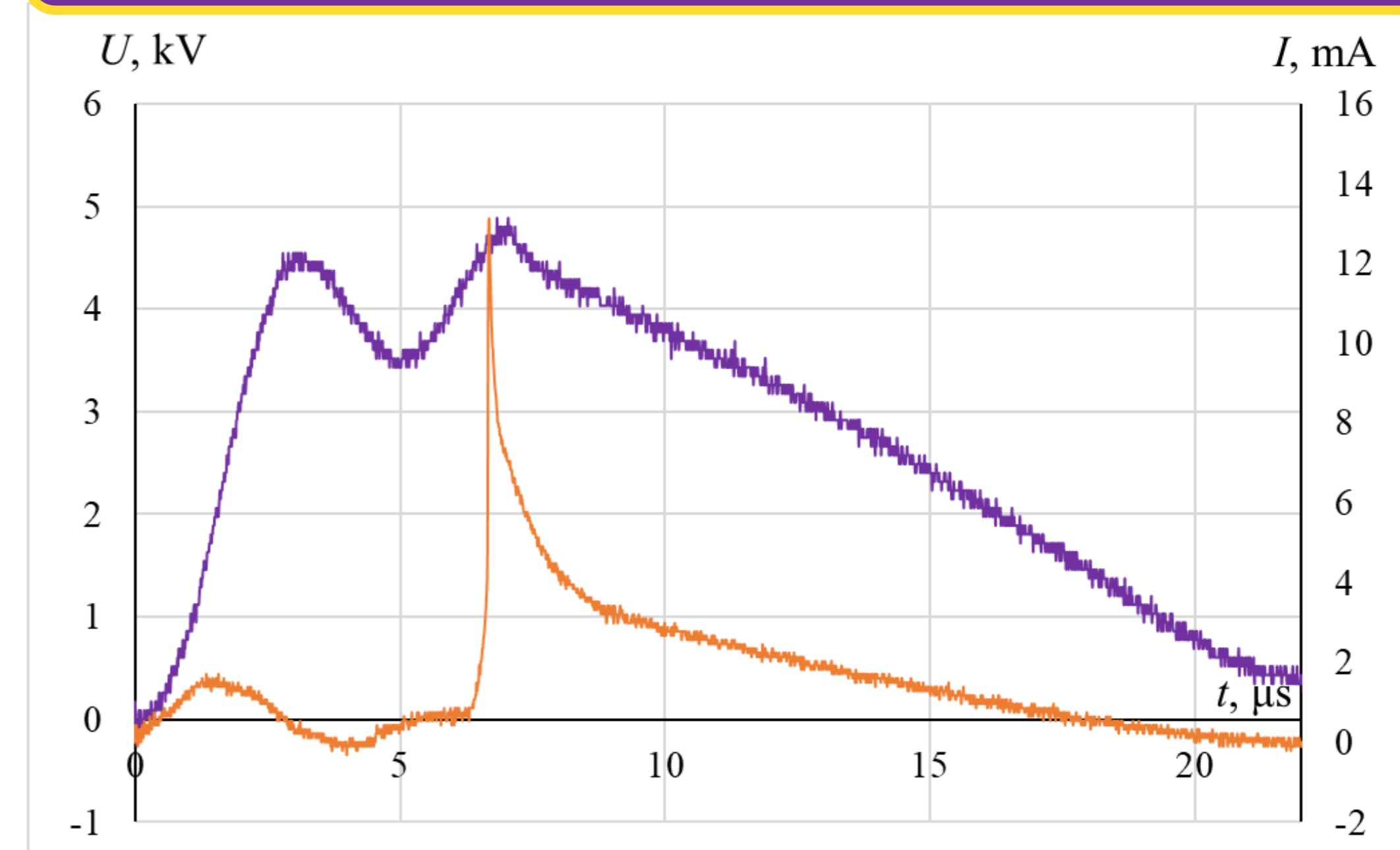
1 - quartz tube; 2 - coaxial channels; 3 - powered electrodes; 4 - capillary; 5 - insulator; 6 - grounded electrode; 7 - gas.

Planar device

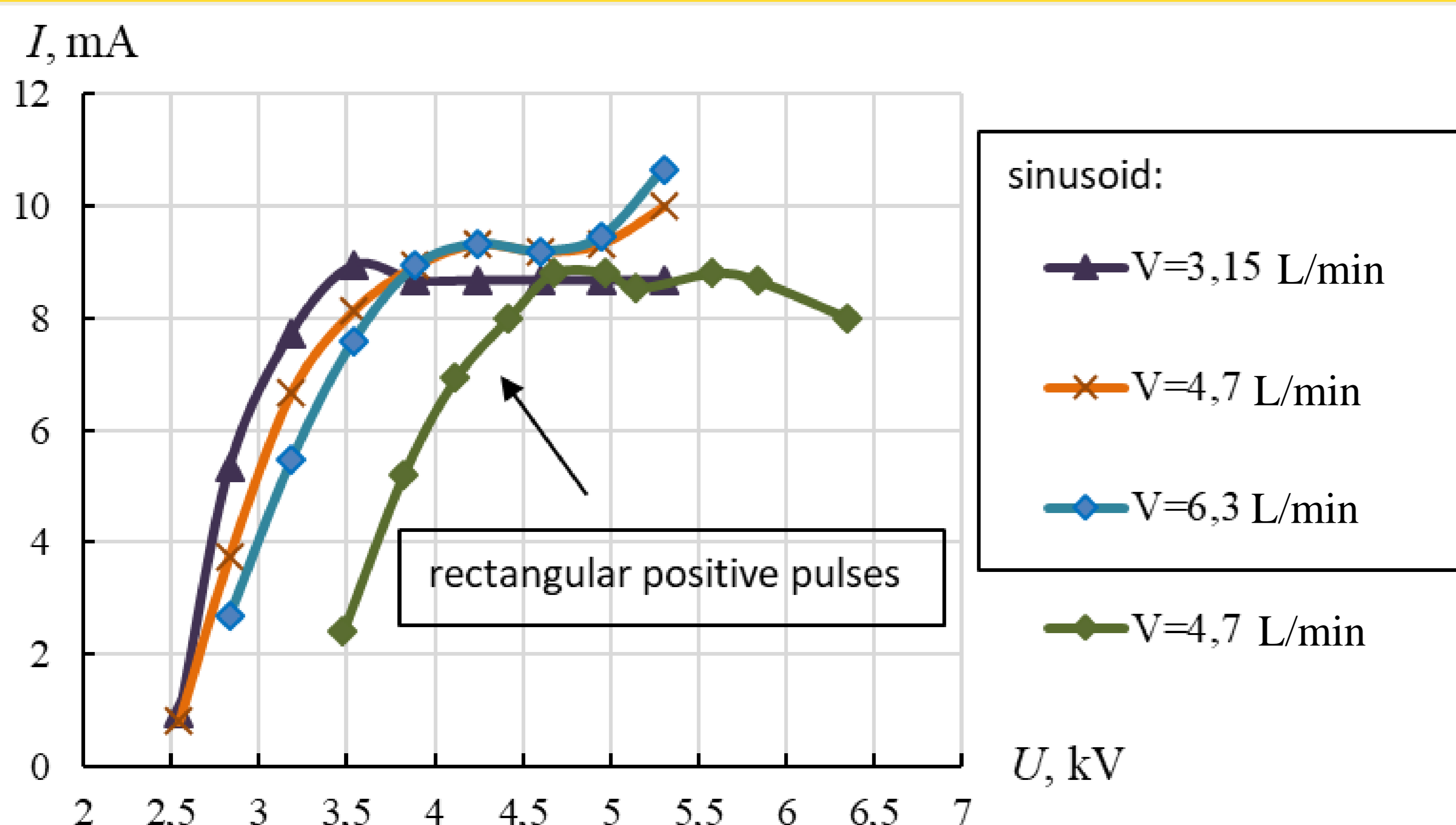


1 - quartz box; 2 - discharge zone; 3 - powered electrode; 4 - capillary; 5 - insulator; 6 - grounded electrode; 7 - gas.

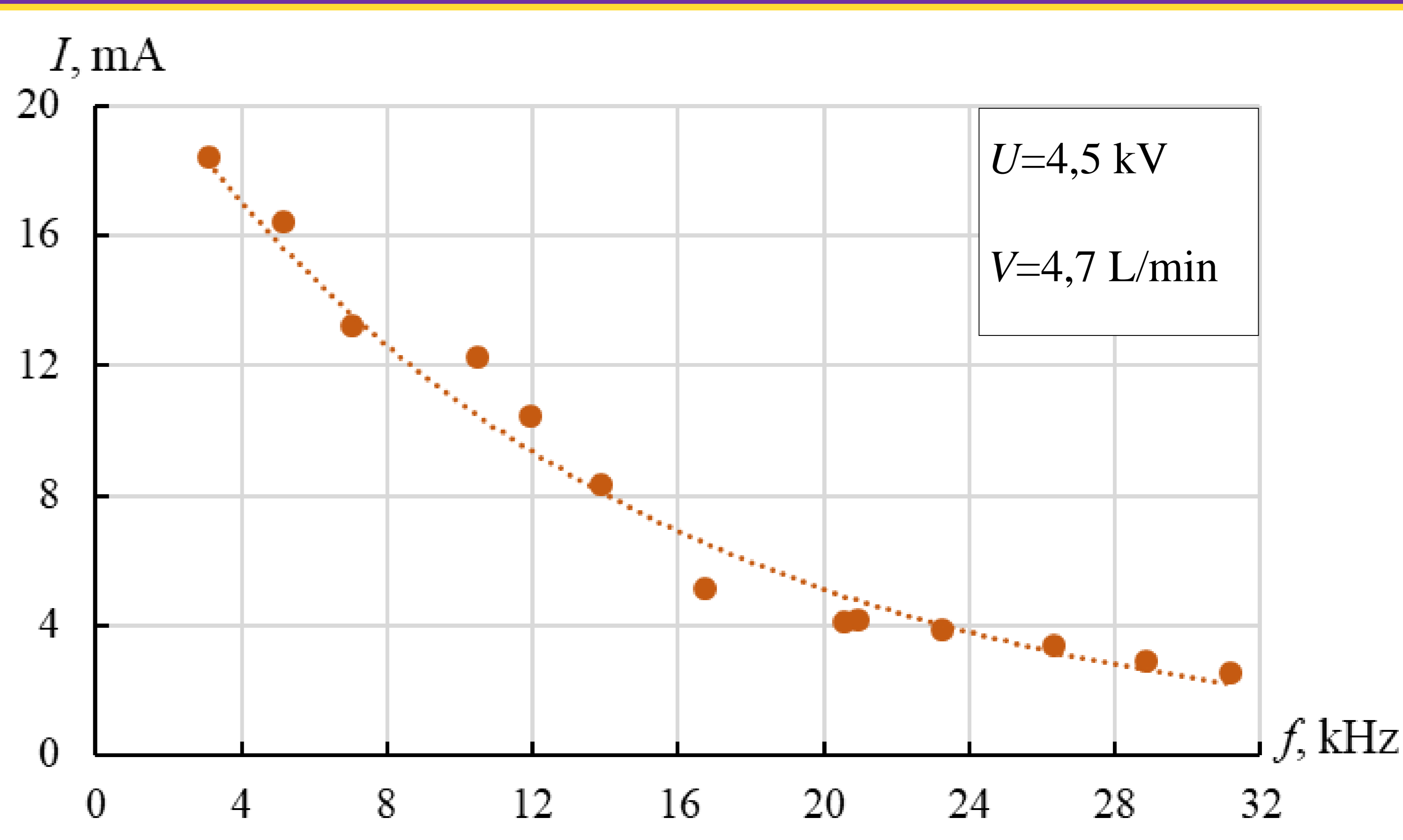
Oscillogram of plasma jet excitation by rectangular positive pulses



Plasma jet current voltage curve



Plasma jet current versus frequency



The measurements were carried out using a shunt introduced into the jet.

The plasma jet delivers large electric fields and a large concentration of energetic electrons followed by active radicals and ions generation in the surrounding air, to the irradiated object. Plasma jet generation by sinusoid excitation and rectangular positive pulses excitation was investigated. The current voltage characteristics of cold atmospheric plasma jets were measured. The experimental results show an exponential dependence of the current on the pulse generation frequency.