

INTERACTION OF HELIUM AND ARGON PLASMA JETS ARRAYS

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We discuss results from computational investigations of the properties of jets arrays operated in He and Ar. He or Ar is flowing through the tubes of the jets into ambient humid air. We show that jet–jet interactions primarily depend on the properties of plasma forming gas through the tubes. For the helium array, the jets at edges of the array tend to divert while for Ar array plasma propagates more directionally.

Non-equilibrium atmospheric-pressure plasma jets and jets arrays are one of the main plasma sources used in biotechnology and plasma medicine. A rare gas or a mixture of a rare gas with a small percentage of a reactive gas such as O₂ are often used as a plasma-forming gases. One solution to increase the area treated is to group many jets together to form an array [1]. In this work, we investigated the properties of four jets arrays operated in He and Ar. For helium, jets on the edges of the array tend to divert while for Ar plasma propagates more directionally. Such a behavior can result from electrostatic, photoionization and gas dynamic origins as shown in Figure 1. For example, N₂⁺ ions are produced at the boundary of the He or Ar channels where the diffusion of N₂ provides a sufficient density of collision partners and there are still enough energetic electrons and excited helium or argon atoms.

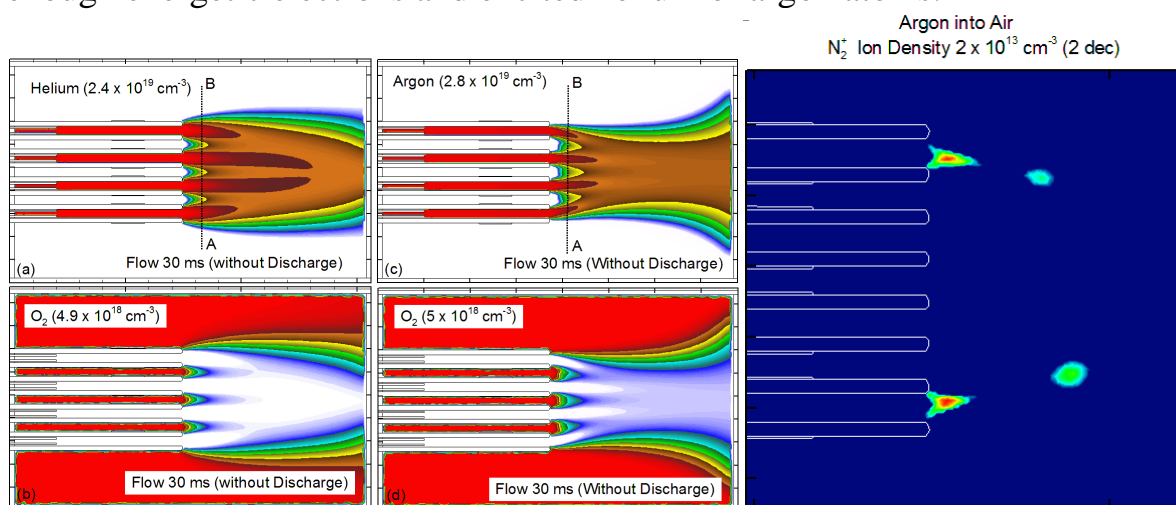


Figure 1. Flow patterns for (a) helium, (b) oxygen for the He array, (c) argon, (d) oxygen for the Ar array, (e) N₂⁺ ion densities for the Ar array.

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ЛИТЕРАТУРА

1. N. Yu. Babaeva, M. J. Kushner. *Plasma Sources Sci. Technol.* **23** (2014) 015007.