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The influence of the impurities N₂ in the working gas on the performance of the atmospheric pressure plasma jet surrounded by ambient N₂ JIANG YUANYUAN, WANG YANHUI, WANG DEZHEN, Dalian University of Technology — A two-dimensional self-consistent fluid model is used to study the characteristics of the atmospheric pressure plasma jets under different impurities level in the working gas with a single ring electrode. A neutral gas transport model was employed to predict the molar fraction distribution of He and ambient N₂ in the system. There were then used in a plasma dynamics model to investigate the characteristics of the plasma jet under different impurities molar fraction during its propagation inside the dielectric tube and outside the dielectric tube. When the molar fraction of N₂ increasing from 0.001% to 1%, the ionization rates of electrons direct impact ionization of He increase because of the increasing of the high energy electrons in the dielectric tube. At the same time, the ionization rates of the electrons direct impact with N₂ increasing because the lower ionization energy of N₂ compared with He. In the tube the density of the He²⁺, He* decrease due to the increasing of the consuming path, which is opposite to the N₂⁺ and N₂*. The velocities of the plasma jets increase in different impurities level with the increasing of the electric field in the front of the ionization head. The plasma jets change from a circular structure to a more uniform structure.

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