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Effects of oxygen concentration on atmospheric pressure dielectric barrier discharge in Argon-Oxygen Mixture[1] XUECHUN LI, DIAN LI, YOUNIAN WANG, Dalian University of Technology — A dielectric barrier discharge (DBD) can generate a low-temperature plasma easily at atmospheric pressure and has been investigated for applications in trials in cancer therapy, sterilization, air pollution control, etc . It has been confirmed that reactive oxygen species (ROS) play a key role in the processes. In this work, we use a fluid model to simulate the plasma characteristics for DBD in argon-oxygen mixture. The effects of oxygen concentration on the plasma characteristics have been discussed. The evolution mechanism of ROS has been systematically analyzed. It was found that the ground state oxygen atoms and oxygen molecular ions are the dominated oxygen species under the considered oxygen concentrations. With the oxygen concentration increasing, the densities of electrons, argon atomic ions, resonance state argon atoms, metastable state argon atoms and excited state argon atoms all show a trend of decline. The oxygen molecular ions density is high and little influenced by the oxygen concentration . Ground state oxygen atoms density tends to increase before falling. The ozone density increases significantly. Increasing the oxygen concentration, the discharge mode begins to change gradually from the glow discharge mode to Townsend discharge mode.

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