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Numerical Study of Discharge Characteristics of Atmospheric Pressure Dielectric Barrier Discharge in Ar/N2 Gas Mixture ABHISHEK KUMAR VERMA, VENKATTRAMAN AYYASWAMY, University of California, Merced — Atmospheric pressure dielectric barrier discharge (DBD) has attracted a significant research interest due to unique discharge characteristics applicable to plasma medicine, material synthesis and plasma enhanced chemical conversion. In this work, we performed 1D/2D fluid model simulation of DBD in Argon gas with Nitrogen as impurity, to study discharge characteristics, such as current-voltage, power dynamics, plasma species enhancement etc. A comparative study on plasma parameters is performed by applying RF power source to excite capacitively coupled plasma. Further, modification of such power source to dual frequency and applied DC bias is studied. The insights from 1D simulations results have been used to design numerical experiments for large simulations. Most of the previous study on this topic focuses on 1D simulations. To study the effect of dimensionality in complex electrode-dielectric geometry, we performed 2D simulations of a roll-to-roll plasma reactor with curved electrode. Also, some simulation perspectives from plasma needle-dielectric configuration is included. This work expands on the idea of providing critical insights for the development of reduced order models to facilitate the design and development of DBD reactor for a wide range of applications.

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