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Properties of DC-Pulsed Microplasma Arrays at Intermediate Pressures[1] PENG TIAN, CHENHUI QU, MARK J. KUSHNER, University of Michigan — Microplasma arrays are being investigated to manipulate electromagnetic waves due to their ability to change electrical properties with a short response time. In these applications, there are often tradeoffs between a short response time, plasma density and uniformity of the plasma, all of which scale with pressure. Controlling of cross-talk between microdischarges is also an issue when there are no physical isolations between microdischarges in the array. These scalings motivate operation at intermediate pressures, 10s to 100s Torr, which by pd scaling corresponds to sizes of the microcavity of hundreds of microns. In this paper, a computational investigation on the scaling of microplasma arrays excited by pulsed dc-bipolar/unipolar waveforms is discussed using results from a 2-dimensional plasma hydrodynamics model. The goal is to maximize the time averaged electron density in a spatially controllable manner while controlling cross-talk between microplasmas that are not physically isolated. We investigated 1-D and 2-D microplasma arrays of sub-mm cavities operating at 10s-100s Torr in rare gases, excited by ns DC pulses with several MHz pulsing frequency. Plasma densities up to 10^{14} cm^{-3} are predicted in Penning mixtures.

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