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Triggering Excimer Lasers by Photoionization from Corona Discharges[1] ZHONGMIN XIONG, University of Michigan, THOMAS DUFFEY, DANIEL BROWN, Cymer, Inc., MARK KUSHNER, University of Michigan — High repetition rate ArF (192 nm) excimer lasers are used for photolithography sources in microelectronics fabrication. In highly attaching gas mixtures, preionization is critical to obtaining stable, reproducible glow discharges. Photoionization from a separate corona discharge is one technique for preionization which triggers the subsequent electron avalanche between the main electrodes. Photoionization triggering of an ArF excimer laser sustained in multi-atmosphere $Ne/Ar/F_2/Xe$ gas mixtures has been investigated using a 2-dimensional plasma hydrodynamics model including radiation transport. Continuity equations for charged and neutral species, and Poisson's equation are solved coincident with the electron temperature with transport coefficients obtained from solutions of Boltzmann's equation. Photoionizing radiation is produced by a surface discharge which propagates along a corona-bar located adjacent to the discharge electrodes. The consequences of pulse power waveform, corona bar location, capacitance and gas mixture on uniformity, symmetry and gain of the avalanche discharge will be discussed.

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