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Dynamics of transient low-pressure plasmas in the vicinity of high-voltage electrodes ANDREI YAKUNIN, ASML, Veldhoven, The Netherlands, ILIA TSYGVINTSEV, Keldysh Institute of Applied Mathematics, Russia, VLADIMIR KVON, ASML, Veldhoven, The Netherlands, VLADIMIR IVANOV, VECHESLAV MEDVEDEV, Institute for Spectroscopy Russian Academy of Sciences (ISAN), Russia, DMITRY ASTAKHOV, ISTEQ B.V., MARK VAN DE KERKHOF, ASML, Veldhoven, The Netherlands — Extreme ultraviolet (EUV) lithography scanners operate in a hydrogen atmosphere with a pressure of several Pascal. Pulses of ionizing EUV radiation lead to the formation and accumulation of plasma throughout the entire optical system of the scanners. We report on the experimental and theoretical studies of the plasma dynamics in the vicinity of biased (and possibly shielded by dielectric) electrodes. For that we designed a model experiment on the interaction of low-pressure hydrogen plasma with remote electrodes and conducted numerical simulations of such a model situation. The results show that in an improperly designed system, high current pulses can occur on positively charged electrodes resulting in potential surface erosion and/or contamination within EUV scanner. We discuss ways to prevent such phenomena.

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