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Reduced Breakdown Delay in High Power Microwave Dielectric Window Discharges via Penning-Like Mixtures and Patterened Metallizations[1] JOHN BOOSKE, BRIAN KUPCZYK, ABELARDO GARCIA, CHIEN-HAO LIU, XUN XIANG, NADER BEHDAD, JOHN SCHARER, University of Wisconsin - Madison — Development of high power microwave (HPM) distributed discharge limiters relies critically on minimizing the delay time between HPM incidence and diffuse plasma creation. We present a range of pulsed plasma experiments conducted in neon, argon, helium, xenon, and mixtures of these gases, from 50-760 torr. Breakdown is achieved by illuminating a gas cell with a $\sim$25kW, $\sim$700 V/cm, 800ns-long pulse of X-band microwave radiation (9.382 GHz) as well as 41Hz pulse trains. Current results focus on experiments with metamaterial window coatings that provide dramatic reductions in breakdown delay. Results from experiments combining these patterned metallizations with the aforementioned gas mixtures resulting in $<$ 20ns breakdown, as well as proposed methods for further breakdown delay reduction, are also presented.

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