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Development of a high-power non-ablative capillary discharge source for plasma-materials interactions studies MICHAEL PACHULIO, FRANCESCO STEFANI, ROGER BENGTSON, LAXMINARAYAN RAJA, The University of Texas at Austin — We report the development of a new non-ablative high-pressure thermal plasma capillary discharge source for studying plasma-surface materials interactions phenomena under pulsed plasma conditions. A key requirement is to allow for a high degree of control over the composition, power, and energy of the plasma, which is not achievable with classical ablative-liner supported capillary discharges. This paper describes the design and performance of a non-ablative capillary discharge that uses a quartz liner, to produce ∼1 eV argon thermal (near-equilibrium) plasma. We describe an approach to reliably ignite the source using a secondary wire electrode that creates a travelling surface discharge along the quartz surface prior to the main discharge event. The argon feed-gas contains 2% hydrogen for permitting additional spectroscopic diagnostics of the plasma. Measurements of plasma temperature, plasma density, and power are provided for various configurations of the power supply and capillary which was operated between 4 and 25 kV.

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