

Abstract Submitted
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Extinction of 10.6 μm laser radiation by free electrons in an argon filamentary discharge at atmospheric pressure S.H. PARK, H.J. YANG, A.E. MIRONOV, S.-J. PARK, J.G. EDEN, Department of Electrical and Computer Engineering, University of Illinois Urbana Champaign — Experiments will be described in which the extinction of 10.6 μm photons by free electrons in a single filamentary discharge is being studied. The extinction ranges from 3 to 10 percent over a path length of 1 cm, depending on the argon flow rate. The temporally- and spatially-averaged electron density in the filament is approximately 10^{15} cm^{-3} , as determined by Stark broadening of the hydrogen alpha (656.28 nm) and argon I (696.54 nm) lines. Calculations indicate that the observed extinction of 10.6 μm is attributable to a combination of inverse bremsstrahlung and a negative lens effect, and experimental results will be compared to theoretical calculations based on Boltzmann's equation. The potential application of such high electron density plasmas to studies of fundamental plasma phenomena, as well as optical applications will be discussed.

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