Abstract Submitted
for the GEC06 Meeting of
The American Physical Society

Confinement of Plasmas in Microcavities with Diamond or Circular Cross Sections and Driven by Al_2O_3 Encapsulated Electrodes K.S. KIM, J.D. READLE, T.M. SPINKA, L.Z. HUA, S.-J. PARK, J.G. EDEN, Laboratory for Optical Physics and Engineering, Dept. of Elec. and Computer Engr., University of Illinois — Arrays of Al/Al_2O_3/glass microplasma devices with microcavities having diamond or circular cross-sectional geometries have been fabricated and operated in atomic and molecular gas mixtures at atmospheric pressure. Microcavities of the device are fabricated in only one of two electrodes, and the thickness of the completed device is less than 200 μm. Spatially-resolved emission from the microcavity is investigated in the microcavity devices having diameters between 50 μm and 500 μm by optical microscopy. Optical micrographs show the operation of the microplasma in two well-defined modes. One of these is evident at higher current densities at which we observe microplasmas centered in microcavities, each having a near-cylindrical cross-sectional geometry regardless of the shape of the microcavity. Also the diameter of the microplasma decreased with rising rare gas pressure to $\sim$20% of the characteristics microcavity dimension. Details of discharge performance and its relation to microcavity shape, dimensions and electric field distribution will be discussed.

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Date submitted: 17 Aug 2006 Electronic form version 1.4