Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Dynamical properties of non-equilibrium atmospheric plasma jets and their applications to plasma processing in liquids KATSUHISA KITANO, Center for Atomic and Molecular Technologies, Osaka University, Japan, IKAWA SATOSHI, Technology Research Institute of Osaka Prefecture, HITOSHI FURUSHO, Institute of Materials Science, University of Tsukuba, YUKIO NAGASAKI, University of Tsukuba, SATOSHI HAMAGUCHI, Osaka University — Non-equilibrium atmospheric pressure plasma jets are discussed with the emphasis on their physics and applications. Plume-like plasmas, which may be called plasma jets, have been generated in a discharge system consisting of a dielectric/metal tube (through which He gas flows at the atmospheric pressure) and a single electrode attached to the tube, to which low-frequency, high-voltage pulses (∼10kV, ∼10kHz) are applied. With visible light images taken by a high-speed ICCD camera, it has been confirmed that the plasma jet consists of a series of small "plasma bullets" that are emitted intermittently from the powered electrode in sync with the positive voltage pulses. The observed "plasma bullet" may be interpreted as a fast moving ionization front. The plasma jets are energetic enough to generate highly reactive charge-neutral radicals but their gas temperatures remain low. Therefore the plasma jets are ideal for processing of liquid based materials at low temperatures and some examples of process applications, such as reduction of cations, polymerization of liquid monomers, and sterilization, will be also presented.

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Date submitted: 24 Jul 2007 Electronic form version 1.4