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Atmospheric pressure microdischarges utilizing nanoporous dielectric electrodes JIN HOON CHO, Department of Electrical and Computer Engineering, Colorado State University, Fort Collins, Colorado 80523, WOONG MOO LEE, Department of Chemistry and Division Energy Systems Research, Ajou University, Suwon 443-749, Korea, CAMERON MOORE, GEORGE COLLINS, Department of Electrical and Computer Engineering, Colorado State University, Fort Collins, Colorado 80523 — We report the generation of microplasmas that use electrodes with nanoporous dielectric surfaces. The electrodes used in the dielectric barrier discharge are made of aluminum rods or plates covered with nanoporous alumina films, $\sim$80 μm thick and mean pore diameters being $\sim$40 nm. The alumina nanoporous film was grown onto Al rod via an electrochemical etching process. The microplasma was sustained using $\sim$10W of AC power at 10$\sim$30 kHz, with a gap of 100$\sim$500 μm between the rod, tube and plate shaped electrodes. The typical driving voltage and the electron density are $\sim$1200V and 10^{11} $\sim 10^{12}$cm^{-3}, respectively while the temperature at the discharge region is in the range of 310-350 K. This type of dielectric barrier discharge effectively generates low temperature uniform microplasmas that can be used for a variety of applications, including UV generation, surface treatment, biomedical treatment, and plasma chemical synthesis.

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