Abstract Submitted
for the GEC11 Meeting of
The American Physical Society

**Bactericial effect of a non-thermal plasma needle against *Enterococcus faecalis* biofilms**[1] CHUNQI JIANG, University of Southern California, C. SCHAUDINN, D.E. JARAMILLO, P.P. SEDGHIZADEH, P. WEBSTER, J.W. COSTERTON — Up to 3 cm long submillimeter-in-scale plasma needle was generated in ambient atmosphere for root canal disinfection. Powered with 1-2 kHz, multi-kilovolt nanosecond electric pulses, this $He/(1\%)O_2$ plasma jet consists of ionization fronts propagating at speeds of the order of $10^7$ cm/s. Plasma treatment of *Enterococcus faecalis* biofilms on hydroxyapatite (HA) discs for 5 min resulted in severe damage of the bacterial cells and sterilized HA surfaces of more than 3 mm in diameter, observed by the scanning electron microscopy. With a curing dielectric microtube placed 1 cm or less below the nozzle, the plasma jet entered even at a sharp angle and followed the curvature of the tube, and reached the bottom of the tube. The bactericidal effect of the plasma needle against *E. faecalis* biofilm grown on the inner surfaces of the tube was demonstrated. However, the bactericidal effect weakens or diminishes for the bacteria grown deeper in the tube, indicating improvement of the plasma treatment scheme is needed. Mechanisms of the plasma bactericidal effects are discussed.

[1]Supported by the National Institute of Dental and Craniofacial Research and the Air Force Office of Scientific Research.

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Date submitted: 22 Jul 2011 Electronic form version 1.4