

**A NOVEL METHOD OF TOOTH WHITENING USING  
A COLD PLASMA MICRO-JET DRIVEN BY DIRECT  
CURRENT AT ATMOSPHERIC-PRESSURE AIR**

Peng Sun, Haiyan Wu, Jue Zhang, Jing Fang  
*Academy for Advanced Interdisciplinary Studies, Peking  
University, Beijing, China*

Jie Pan  
*Peking University School of Stomatology, Beijing, China*

Ye Tian, Fuxiang Liu  
*West China College of Stomatology Sichuan University,  
Si Chuan, China*

WeiDong Zhu  
*Saint Peter's College, Jersey City, New Jersey, USA*

Kurt Becker  
*Polytechnic Institute of New York University, New York, USA*

Eating habits, smoking, drugs and chemicals can cause undesirable staining of teeth. Tooth bleaching has become a popular dental practice to remove stains from the tooth surface for aesthetic or therapeutic purposes. Clinical teeth-whitening involves the application of H<sub>2</sub>O<sub>2</sub> gel (35%), which might be harmful after prolonged use.

In this paper, we present tooth-whitening results of extracted teeth treated by a direct-current, cold, atmospheric-pressure air plasma micro-jet (PMJ). Saline solution (0.9% NaCl) was applied to teeth during the treatments to keep the tooth surface moist. Compared to our previous work of teeth whitening using a PMJ assisted by H<sub>2</sub>O<sub>2</sub> gel<sup>1</sup>, a significant improvement of tooth-whitening effect was observed. Atomic oxygen emissions were observed in end-on optical emission spectroscopy. Strong OH radical signals were detected by electron spin resonance. The tooth surface temperature was monitored and found to remain below 40° C. The surface properties of the teeth were evaluated by SEM and a microhardness test. This novel tooth-whitening approach, especially the elimination of the H<sub>2</sub>O<sub>2</sub> gel, might revolutionize clinical tooth whitening.

1. P. Sun, J. Pan, Y. Tian, N. Bai, H. Wu, L. Wang, C. Yu, J. Zhang, W. Zhu, K. Becker and J. Fang, "Tooth-Whitening with Hydrogen Peroxide Assisted by a Direct-Current, Cold, Atmospheric-Pressure Air Plasma Microjet", IEEE Transaction on Plasma Science, 2010, in press

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