

Abstract Submitted  
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**Surface Treatment System Using Dielectric Barrier Discharge<sup>1</sup>**

RYAN DANIELS, SOPHIA GERSHMAN, JESSICA FAUST, Princeton Plasma Physics Laboratory — Atmospheric pressure plasmas have been used recently to improve surface properties of materials. For example, plasma treatment improves wettability, activates and functionalizes the surface of polyethylene making it more suitable for biological applications. We have designed and constructed a system that allows the study of the effect of dielectric barrier discharge (DBD) on the surface properties of treated materials. Preliminary results show that 55 second treatment by the DBD in a 1mm gap reduces the contact angle of polyethylene from  $78^\circ \pm 1^\circ$  before to  $40^\circ \pm 1^\circ$  after the treatment. The DBD is generated using a 15kV, 1kHz pulsed dc power supply a mixture of Ar and O<sub>2</sub> as the carrier gas. The study parameters include the ratios of O<sub>2</sub> to Ar, the power supply frequency and duty cycle. To perform surface analysis, we have designed a transfer chamber. A bellows drive is used to transport the sample to the mobile transfer chamber and then to a test chamber without exposure to the environment. Plasma treatment improves biological compatibility of polyethylene and makes it suitable for use in implants, prosthetics, and cell cultures.

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