Surface Treatment of Polyester Fabric with atmospheric pressure plasma

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Abstract
Polyethylene Terephthalate (PET) fabric, a recycled synthetic fiber, has been frequently studied to innovate increased usage in both the clothing and medical industry. Some include ways to dye the fabric so that it can be commercially used for the purpose of environmental conservation from frequent discard of nonrecyclable fabric. Some biomedical applications involve the application of plasma treatment to reduce bacteria adhesion and improve anti-bacterial properties on the fabric. However, neither have been successful due to a lack of understanding of the surface modification of PET fabric to enable such properties. The hypothesis is that hydrophobicity is an issue in this study. The goal is to modify the surface of PET cloth to obtain a hydrophilic property through atmospheric-pressure plasma surface modification. Dielectric barrier discharge (DBD) plasma irradiation is a technique involving the electrical discharge between two electrodes separated by an insulating barrier. At a constant peak voltage, the smoothly flowing argon gas is turned into plasma, and the plasma is applied to the PET cloth surface. New functional groups are made or altered and attached to the surface layer which changes the character of the membrane but not its bulk properties. This study analyzes and reports on changes in surface hydrophobicity. This process tested three parameters followed by water contact angle, XPS, and FTIR analysis. PET fabric successfully gains a hydrophilic property through plasma treatment along with consistency in results of surface modification from FTIR and XPS. However slight differences in results still do appear which must be further analyzed.