

# Plasma Surface Modification of e-PTFE Materials

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## Abstract

The Teflon (or PTFE) materials have been widely used in various industrial environments based on their chemical stability, low friction, hydrophobic surface, and low dielectric properties. ePTFE materials with porous structure further extend their applications. However, this circumstance of strong C-F bonding has limited the use of PTFE substrates in microelectronics, where strong adhesion of contacts is required; or in medical engineering where functional groups need to be immobilized on the surface.

In this study, the surface modification of e-PTFE materials was performed by RF plasma system. The effects of process parameters including the selected gases (N<sub>2</sub> and Ar), and plasma generation power on the hydrophilic properties of e-PTFE materials were investigated. The related reaction mechanisms between plasma and e-PTFE materials were also discussed. The samples present obvious hydrophilic surface after Ar and N<sub>2</sub> plasma treatment at a higher RF power (50 ~ 400 W). The contact angle of 22° can be obtained after N<sub>2</sub> plasma treatment at a RF power of 400 W. The weakening of the characteristic bonds of CF<sub>3</sub> and CF<sub>2</sub> and the formation of cross-linked C=N-H layer are the main reason leading to a hydrophilic surface. However, further increasing the RF power to 500 W tends to produce a hydrophobic surface due to the formation of the needle-like surface caused by severe plasma etching effects.

Keyword : RF plasma, e-PTFE, hydrophilic