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**Surface modification of Poly(tetrafluoroethylene) and Poly(vinylidene difluoride) using atmospheric pressure plasma jet in Ar/CO<sub>2</sub> mixtures**Abdollah Sarani<sup>1</sup>, Emile Carbone<sup>2</sup>, Anton Yu Nikiforov<sup>3</sup>, Christophe Leys<sup>3</sup>, François Reniers<sup>2</sup>

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Polytetrafluoroethylene (PTFE) is utilized in many engineering applications, but low wettability and adhesion properties to other materials have limited its use. In this work, Poly(tetrafluoroethylene) and Poly(vinylidene difluoride) (PVDF) film surfaces are modified using Ar/CO<sub>2</sub> plasma, and the effects of the modification on the hydrophilicity of PTFE and PVDF are investigated. A plasma jet working under atmospheric pressure has been developed for surface treatment. Plasma is generated in pure Ar and Ar/CO<sub>2</sub> mixture. The system is applied for modification of Teflon (PTFE) and Polyvinylidene difluoride (PVDF), polymers. The surface properties of PTFE and PVDF films before and after the treatments are studied using water contact angle and X-ray photo electron spectroscopy (XPS). The effect of treatment time, initial CO<sub>2</sub> flux in inlet gas, distance from plasma and applied voltage are investigated. WCA analysis shows that the water contact angle in case of both polymers decreased: water contact angle of PVDF decreases from 72 to 58 and in case of PTFE from 110 to 90 degrees. Polymer surface treatment was confirmed by XPS results. It was shown that PTFE treated by Ar/CO<sub>2</sub> (2,9 slm/100 sccm) with a treatment time of 40 second, distance 2 mm and applied voltage 6 KVpk-pk, contain 63% F, 4% O and 33% C while PTFE treatment in the same condition and 20 min has shown higher content of oxygen: 50% F, 26% O and 24% C. Comparison of results between pure Ar discharge and Ar/CO<sub>2</sub> plasma has been made. Our experiments shown better treatment in case of Ar/CO<sub>2</sub> plasma, compare with pure Ar plasma. In order to characterize plasma jet, optical emission spectroscopy has been done and active species are investigated.

**Keywords**

surface modification  
Polytetrafluoroethylene  
Poly(vinylidene difluoride)  
plasma jet  
atmospheric pressure plasma