

Characterization of Treated Polyester Fabrics By Low Pressure Plasma

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Abstract – With the aim to modify polymeric surfaces, several researches has been using plasma technique, because it can create hydrophilic functional groups such as COOH, OH e CHN. The plasma treatment alter only nanometric layers altering its wettability, adhesion and dyeing adapting them to specific applications. The polymer studied for our group was polyester widely used at textile industry to films and fabric production. So, polyester fabrics were treated by plasma for 60 minutes living all the others plasma parameters constants. In this work was used the optic emission spectroscopy to diagnose “in situ” the plasma complex process. The samples were analyzed by scanning electron microscopy, Raman microscopy and IR-ATR to evaluate the plasma treated samples.

Polymers are distinguished by their low density, flexibility, ease of manufacture, and cost-effectiveness. However, their surface properties are not appropriate for some specific applications regarding dyeability, wettability, biocompatibility, adhesion, printability, hardness and membrane permeability[1,2]. Hence, an additional surface modification is required to achieve the desired properties, while maintaining the characteristics of the volume. Primarily, a plasma treatment provides manifold possibilities to refine a polymer surface, enabled by the adjustment of parameters like gas flows, power, pressure and treatment time [3, 4].

With intention to evaluate the wettability increasing of 100% pet fabrics treated by plasma and to study the ageing effect after one year storage. Fabrics 100% pet were treated in a mixture plasma atmosphere of N₂ e O₂ to observe the best result in ageing wettability time.

After plasma treatment, the wettability effect, topography and chemical surface composition was evaluated. Wettability was analysed through capillarity measures, so it was used a vertical test developed by the group Lab-plasma – UFRN. The topography was studied by scanning electronic microscopy (SEM). Measures obtained by the reflected total attenuated and Raman spectroscopy was used to identify the modified chemical composition of the treated plasma samples comparing to those that was not treated.

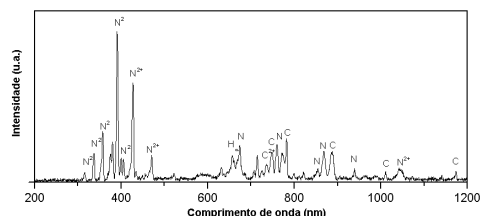


Figure 1: Grafico de OES para tratamento com N₂

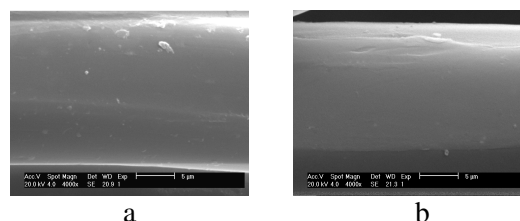


Figure 2: Mev de fibras de polyester a) Não tratada. b) 80% N₂ + 20% O₂

The wettability increase is due to the formation of hydrophilic groups on the surface caused by the oxygen quantity increase and inserting nitrogen on polyester surface. This affirmation can be confirmed studying the aging wettability.

References

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