

# TPU/LDPE blends compatibilisation for fabric coatings: Mechanical, morphological and rheological characterization

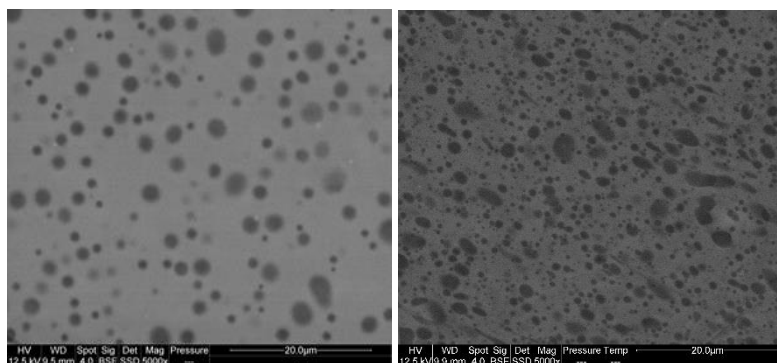
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## Abstract

The blending of two or more polymers is widely used to achieve special properties that the components alone do not possess (1). Thermoplastic PolyUrethane /Low Density PolyEthylene (TPU/LDPE) blends are more and more used for coated textile to extrude the polymer sheets at higher temperatures. The mechanical lock between the extruded polymer sheet and the fabric could be overridden by this method. However TPU/LDPE blends must have equivalent mechanical properties than TPU. It is well known that polyolefin, like LDPE, and TPU are highly incompatible resulting in an important loss of mechanical properties and a high interfacial tension (2). Previous researches have shown that the maleic anhydride is a good compatibiliser for these materials. In this study, LLDPE-g-Ma (Linear Low Density PolyEthylene grafted maleic anhydride) is added with several percentages in the blend to act as a compatibiliser (3). To evaluate the compatibility of the blends and the mechanical properties of the sheets produced by cast-extrusion, several methods are involved. Tensile strengths tests assess the mechanical behavior of the blend. Two types of morphology analyses are used; a laser granulometry to determine the nodules sizes distributions of the blends and SEM observations (Figure 1) with image analysis to evaluate both the nodules circularity distributions and confirm the nodules size distributions.



*Figure 1: TPU/LDPE coating film morphology for uncompatibilized (left) and compatibilized blend (right)*

From rheological experiments, the Palierne's model (4) assesses the compatibility of the polymer through the value of the interfacial tension. The two methods used to obtain the granulometry distributions give almost the same results for blends with circular nodules. The results show a strong increase of the sheets tensile strength with the compatibilisation and a decrease of nodules sizes. The nodules circularity also decreases with the compatibilisation because of the appearance of co-continuous phases. Finally the interfacial tension of the blends strongly decreases with the addition of maleic anhydride.

## References

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