# Synthesis of Polytetrafluoroethylene Based Olefinic Copolymer by Radiation-Induced Grafting

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High speed extrusion of linear low density polyethylene (LLDPE) is limited by a process shortcoming known as 'melt fracture' or 'sharkskin', which is a surface defect of the extruded polymer. This defect results in a product with a rough surface that lacks luster and in modification of specific surface properties. The fluoropolymer processing additives are used to eliminate the surface defect by coating the die wall and inducing slip at the fluoropolymer/LLDPE interface.

The aim of this study was to obtain a recycled polytetrafluoroethylene polymer with an olefin that could improve the extrudability of the LLDPE. The copolymer was obtained by irradiating recycled PTFE in an inert atmosphere followed by the addition of an olefinic monomer to graft the latter in the polymeric matrix (PTFE). After a certain time of contact, the copolymer was heat treated to allow recombination and elimination of the radicals, both in a reactive and/or inert atmosphere.

Three olefinic monomers were used, namely; acetylene, ethylene and 1,3-butadiene. The 1,3-butadiene monomer was found to be more effective with respect to grafting. The specimens were studied using Fourier transform infrared spectroscopy (FTIR), thermogravimetric analysis (TGA) and differential thermogravimetry (DTG). 0.2-2.0 wt% of the copolymer that was obtained was mixed with LLDPE. The rheological properties of the mixture were determined with a torque rheometer. The results indicated that the process used rendered a copolymer which when added to LLDPE, improved the extrusion process and eliminated the defect 'melt fracture'.

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