



## NEAR-INFRARED SPECTROSCOPY FOR THE ON-LINE CHARACTERIZATION OF NANOCOMPOSITES

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Polymer nanocomposites based on layered silicate clays are finding increasing practical application due their high performance even at low clay incorporation levels. However, the actual manufacture of these compounds continues to face difficulties, namely in terms of establishing clear correlations between processing conditions and final dispersion levels. Therefore, the availability of fast-responsive informative on-line techniques is of great practical interest. In recent years, the developments in fiber optics brought up a renewed interest on near-infrared (NIR) spectroscopy for monitoring/control purposes. Currently, this analytical tool is applied in many chemical production processes. In the case of the polymer industry, NIR spectroscopy is routinely used to analyze monomers prior to polymerization, to control the evolution of polymerization reactions, or to monitor degradation and/or other chemical changes.

The present work aims at applying NIR spectroscopy to monitor on-line the dispersion of organoclays into polymeric matrices. Nanocomposites based on polypropylene (PP) and nylon-6 (PA6) matrices and on an organo-layered nanosilicate were prepared in a co-rotating twin-screw extruder under different processing conditions and the nanoclay dispersion level at a given barrel location was monitored on-line by NIR. Several off-line techniques (including mechanical testing, rheometry, X-ray diffraction, medium FT-IR and OM/SEM) were used as reference to develop a reliable and robust chemometric model of nanoclay dispersion level. The results showed that NIR can be a powerful on-line quality control tool during the manufacture of nanocomposites.