

# DEVELOPMENT OF XRD BASED ON-LINE CHARACTERIZATION OF SEMICRYSTALLINE PLASTICS

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## Abstract

Development of a prototype X-ray diffraction (XRD) analyzer for nondestructive, on-line monitoring for critical plastic film crystalline characteristics, including percent crystallinity, crystal size, and crystal orientation of widely used semi-crystalline PP and PET plastics is presented. The feasibility for a rapid, fixed detector, online measurement technique has been demonstrated. Details about the preliminary studies of the correlation of XRD crystalline index (CI) with conventional, laboratory-based differential scanning calorimetry (DSC) measurements of volume crystallinity is also given. Furthermore, the correlation between the XRD and DSC measurements for both biaxially oriented plastics and non-oriented plastics is discussed. The feasibility for a fixed detector arrangement to enable rapid, real time production qualified measurements in plastic film and packaging industrial fabrication facilities is also discussed.