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IN-LINE CHARACTERIZATION OF THE SECOND PHASE DEFORMATION DURING POLYMER BLEND EXTRUSION

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The morphology developed by a polymer blend during extrusion is an essential tool to understand their properties. Conventional off-line characterization techniques are frequently used in order to analyze the dispersion of the second phase. However, the application of real-time characterization of the flow in the extruder is increasing in importance, due to the fast data acquisition and interpretation. In this work we have evaluated the dispersion and deformation of the second phase during processing in a co-rotational twin-screw extruder. At the exit of this extruder it was added an in-line optical detector and an on-off valve. Firstly a polymer blend containing PP/PS
99.75/0.25% w/w was melt mixed in this extruder. Secondly a fixed amount of this well mixed blend was added in the same extruder, the exit valve was closed and the mixture reprocessed during 2 min. After the reprocessing the valve was opened and the discharge of the molten polymer mixture was done under a controlled die-pressure. The set pressure was produced changing the extruder screw rotation speed via software with a PID controller. At the same time the flow of the discharging blend was scanned by the in-line optical detector, following the turbidity of the molten polymer mixture. The turbidity is maintained constant while the valve is closed, i.e., with no flow indicating stability of the blend morphology. Upon discharge the turbidity is a reversible function of the die pressure, indicating deformation of the second phase droplets.