SOLUTION CRYSTALLIZATION AND DISSOLUTION ANALYSIS OF POLYMERS AS MONITORED BY SCALLS

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ABSTRACT

The crystallization behaviour of semi-crystalline polymers have been measured and represented by most commonly used methods, such as temperature rising elution fractionation (TREF) or crystallization analysis fractionation (CRYSTAF). Both these techniques require complex instrumentation and long analysis times. A turbidity fractionation analyser, also known as Solution Crystallization by Laser Light Scattering (SCALLS), was developed in our group[1] following the original paper by Shan et al.[2] The SCALLS system has advantages over the conventional TREF and CRYSTAF. Advantages include short analysis times, fairly inexpensive instrumentation, the ability to observe both the solution crystallization and solution melting of polymers, the small amounts of solvent required and the setup allows for a wide selection of solvents to be used[3].The use of SCALLS for crystallization and dissolution studies of polyolefins has previously been reported by van Reenen et al.[1, 4]

During recent years, biopolymers have attracted great attention in both academia and industry. Among the biopolymers, poly(lactic acid) (PLA) has been used most extensively, not only for the reasons it is biocompatible and biodegradable but also because it can be obtained from renewable resources. During this study we discuss the solution crystallization and dissolution behaviour of binary blends of poly(L-lactic acid)(PLLA)/poly(D-lactic acid)(PDLA) and PLLA/poly(butylene succinate)(PBS). The SCALLS method was found to be an effective tool to investigate this unexplored area of PLA research.

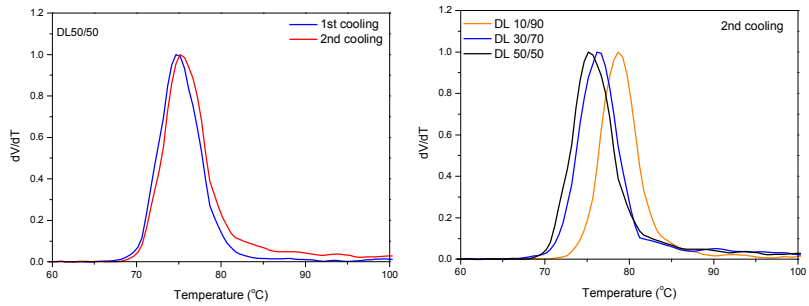

Fig. 1: SCALLS crystallization profiles for PLLA/PDLA blends.

References:

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