# SOLUTION CRYSTALLIZATION KINETICS OF POLYOLEFINS

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## ABSTRACT

Understanding the effects of molecular weight and long-chain branching on polyolefin crystallization are important to get a better and more complete interpretation of different fractionation techniques. Traditionally, the crystallization behaviour of polymers have been measured and represented by temperature rising elution fractionation (TREF) or crystallization analysis fractionation (CRYSTAF) and both these techniques are based on crystallization from dilute solution. Nieto et al.[1] and Anantawaraskul et al.[2] studied the effects of molecular weight on the crystallizability of polyethylene homopolymers and ethylene α-olefin copolymers respectively, both using CRYSTAF as fractionation technique.

A turbidity fractionation analyzer was manufactured at the University of Stellenbosch[4]. To this end, major developments have been made to the Solution crystallization analysis by laser light scattering (Scalls) instrumentation. These developments include the simultaneous use of three lasers with different wavelengths to study solution crystallization kinetics as well as dissolution events. Our technique is based on the design published by Shan et al.[5] and allows for the analysis of crystallization and solution melting of a polymer from dilute solution. As the solution is cooled down, it causes the dissolved polymer to crystallize which then again lead to scattering of laser beams and a decrease in laser beam intensities passing through the polymer solution. This study focuses on the solution crystallization of polyethylene (PE) and the influence of molecular weight on crystallization.

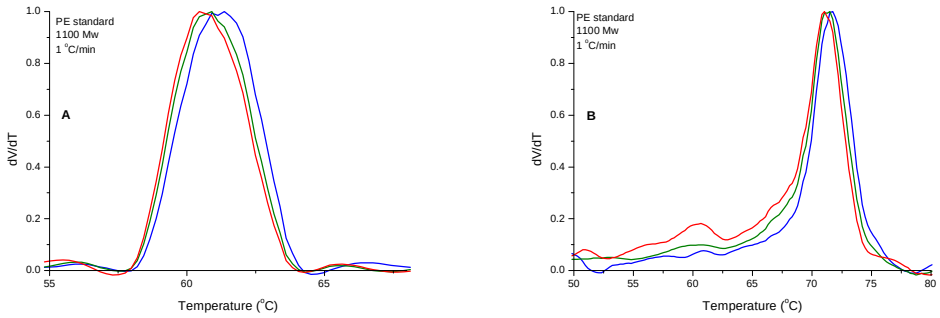


**Fig 1: (A)** Cooling profiles and **(B)** dissolution profiles of a PE sample showing the signals of the three different lasers.

References:

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