



	<b>Experiment title:</b> What governs morphology in flow induced crystallization, rheology or molecular architecture?	<b>Experiment number:</b> 26-02- 468
<b>Beamline:</b> BM26B	<b>Date(s) of experiment:</b> From 06/04/2009 at 08:00 to 09/04/2009	<b>Date of report:</b> 16/04/2009
<b>Shifts:</b> 12	<b>Local contact(s):</b> Dr. Lucia FERNANDEZ-BALLESTER	
<b>Names and affiliations of applicants ( * indicates experimentalists):</b> Dr. Lucia FERNANDEZ-BALLESTER <sup>*2</sup> , Dario CAVALLO <sup>*1</sup> , Tim VAN ERP <sup>*1</sup> , Dr Jan-Willem HOUSMANS <sup>*1</sup> , Dr. Luigi BALZANO <sup>*1</sup> <sup>1</sup> <i>Department of Mechanical Engineering, Technische Universiteit Eindhoven, P.O.Box 513, 5600 MB Eindhoven, the Netherlands</i> <sup>2</sup> <i>ESRF</i>		

## Report:

It is well known that the crystallization of a polymer is affected by the molecular structure. The presence of a co-monomer, for instance ethylene, alters the normal crystallization behavior of polypropylene. In this beamtime, we have studied this issue investigating propylene based polymers containing varying amount of ethylene randomly distributed in the chain backbone. More precisely, we have investigated a polypropylene homopolymer (H) and two random copolymers with 4 and 8 wt% of ethylene (C4 and C8).

As shown in Figure 1, during quiescent crystallization, the presence of ethylene suppresses the crystallization point of the material.

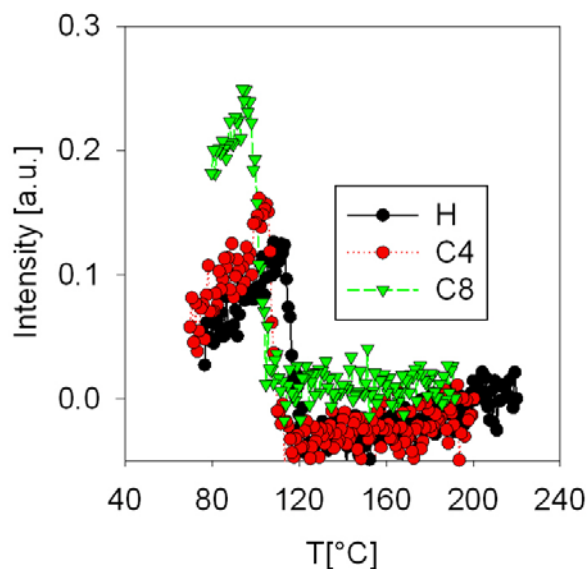


Figure 1: Intensity as a function of the temperature during cooling (5C/min) for H, C4 and C8.

Clear distinctions are also observed in the crystallization of these materials after application of a shear flow. For these experiments, we chose to keep a constant undercooling of 21C.

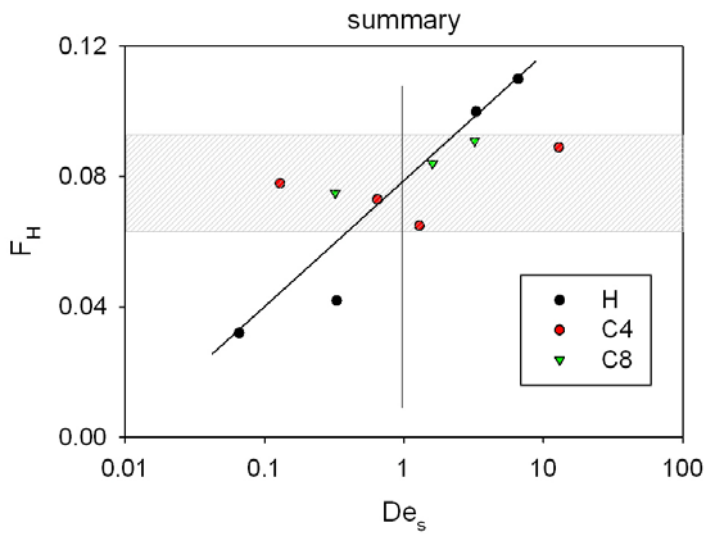


Figure 2: Orientation factor as a function of Deborah number in isothermal conditions

As shown in Figure 2, the orientation of crystals is rather constant in the copolymers whereas it increases with  $De$  for the homopolymer.