Mathematical Model of Crystallization Elution Fractionation of Ethylene/1-Octene Copolymers.

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Crystallization elution fractionation (CEF) is the polymer characterization technique based on chains crystallizabilities for estimating the chemical composition distribution (CCD) of semi-crystalline copolymers. This technique combines the fractionation concepts between the crystallization step of the dynamic crystallization technique (DC) and the elution step of the temperature rising elution fractionation technique (TREF) to enhance the physical separation and analysis time.

In this work, the CEF model based on the population balance, crystallization/dissolution kinetics and axial dispersion models is further developed from the previously proposed DC model. The proposed model can adequately describe the experimental CEF results of ethylene/1-octene copolymers with different average comonomer contents at various operating conditions (i.e., cooling rate, crystallization flow rate, heating rate, elution flow rate). In contrast with the results found in DC, the axial dispersion behavior during both crystallization and elution steps was found to be negligible in CEF analysis.

References:

1. N. Chokputtanawuttilerd, S. Anantawaraskul and J.B.P. Soares. *Macromol. Symp.* **2013**, 330, 132-141.
2. N. Chokputtanawuttilerd, S. Anantawaraskul, A.A. Alghyamah and J.B.P. Soares. *Macromol. Chem. Phys.* **2013**, 214, 2591-2601.