

Structural investigation of C3C2 random copolymers by thermal fractionation technique.

Mara Destro, **Federica Malizia**, Giorgio Nadalini, Giuseppe Ferrara

Basell Poliolefine Italia S.r.L. (Italy)

The molecular structure of polymers largely affects their final properties, in particular, in the case of PP random copolymers, the versatility of final uses can be enhanced and tailored by the control over the ethylene distribution along the chains. This justifies the great interest in gaining information on chain architecture.

Normally ethylene distribution and content are mainly studied by the Preparative Temperature Rising Elution Fractionation (P-TREF) technique. This technique produces separation by the elution of polymer fractions at successively rising temperatures of a material that has been previously crystallized from solution on an inert support during very slow cooling. This slow crystallization from the solution favors molecular segregation mainly by chain crystallizability and the collected fractions are then characterized by several different techniques such as NMR, DSC, XRD, etc..

Inspired by TREF methodology it is possible to carry out a thermal fractionation of a material, starting from the melt, by applying carefully designated temperature program to the sample. This thermal fractionation method will induce molecular segregation as a function of the ability of chains to crystallize at specific temperature, i.e. depending mainly on ethylene content and distribution.

At ICPC 2014 we would like to discuss in depth the differences and similarities of information obtained by detailed studies of four random copolymers by TREF and thermal fractionation. The four investigated materials have very similar ethylene content and molecular weight distribution, but they were generated by using different Ziegler-Natta catalysts. Therefore, the considered materials represent the suitable samples to test the sensitivity of the studied fractionation techniques to the microstructure impressed to the polymers by the different catalytic systems.