

CHEMICAL COMPOSITION SEPARATION OF EP COPOLYMERS BY TREF, CRYSTAF, CEF AND HT-SGIC: CRYSTALLIZATION VERSUS ADSORPTION

Sadiqali Cheruthazhekatt*, Harald Pasch

Department of Chemistry and Polymer Science, University of Stellenbosch, 7602 Matieland, South Africa

*Email: sadiq@sun.ac.za

ABSTRACT

The comonomer can disrupt the crystallization behaviour of a semicrystalline copolymer. This depends on the nature and amount of the comonomer incorporated and it will vary the degree of crystallinity, thereby the melting and crystallization temperatures. Since one of the most important properties of such polymer is its crystallinity, it seems appropriate to fractionate into its component parts according to their ability to crystallize. Temperature rising elution fractionation (TREF), crystallization analysis fractionation (CRYSTAF) and crystallization elution fractionation (CEF) are the various separation techniques that are widely used for the compositional analysis based on crystallizability.^{1,2} There are several limitations to these techniques that are related to the underlying fractionation principles. Most prominently, they are applicable only to crystallizable samples. Accordingly, components having similar crystallizabilities will co-crystallize which limits the true compositional analysis of such materials. To overcome these limitations and to accomplish complete compositional fractionation of amorphous and semicrystalline olefin copolymers, recently developed high-temperature solvent gradient interaction chromatography (HT-SGIC) shall be used.³ In this way the present paper describes a comparative study on various fractionation approaches that are based on crystallization and adsorptive interaction of macromolecules.

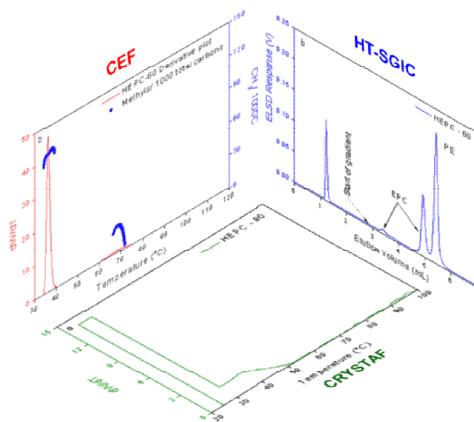


Fig. 1: Comparison of the chemical composition separation obtained by CRYSTAF, CEF and HT SGIC for a heterophasic ethylene-propylene copolymer.

References

- ¹Cheruthazhekatt, S.; Pijpers, T.F.J.; Harding, G.W.; Mathot, V.B.F.; Pasch, H. *Macromolecules* **2012**, *45*, 2025-2034.
- ²Cheruthazhekatt, S.; Pijpers, T.F.J.; Harding, G.W.; Mathot, V.B.F.; Pasch, H. *Macromolecules* **2012**, *45*, 5866-5880.
- ³Cheruthazhekatt, S.; Mayo, N.; Monrabal, B.; Pasch, H. *Macromol. Chem. Phys.* **2013**, *214*: 2165–2171.