REFRACTIVE INDEX INCREMENTS OF EVA-COPOLYMERS

Elisabeth Schulz, Prof. Dr. Markus Busch*

* Technische Universität Darmstadt, Ernst-Berl-Institut, Alarich-Weiss-Straße 8, 64287 Darmstadt, Germany
email: markus.busch@pre.tu-darmstadt.de

ABSTRACT

Since the dawn of humanity societies rely on resilient materials meeting the necessary physical demand to withstand permanent application. With the engineering ingenuity of the 20th century came the discovery of a new type of material: synthetic polymers. Due to their high versatility, lightweight, ease of processing and mass-production, high resilience as well as moldability to complex architectures polymers have now outgrown most human-made materials with a production of 322 million tons in 2015.1,2 An example for a widely applicable polymer is polyethylene-vinyl acetate (EVA), a copolymer containing ethylene and vinyl acetate. EVA copolymers contain a diverse spectrum of materials with a broad range in applications. Next to others, EVA copolymers are employed in the wire and cable industry for heat shrinkable insulation, semi-conductive insulation jackets and flame retardant insulation.3 Due to the complex structure-property-relationship of polymers it is mandatory to examine the EVA copolymers as precisely as possible.

During the last few decades, high temperature GPC-MALLS analysis of polymers has been well established. Hereby, the multi-angled laser light scattering analysis (MALLS) is employed to determine the absolute molecular weight distribution and other characteristics such as the radius of gyration (Rg) of polymers.4 However, in order to apply this technique, the refractive index increment (dn/dc) of the polymer is essential. This polymer specific parameter is a function of the employed solvent, temperature and wavelength, which has to be considered during selection of appropriate values in analytics.5 While dn/dc data of most homopolymers for various temperatures, wavelengths and solvents are available in literature, the accessibility of respective literature data for copolymers is scarce.

In this work the dn/dc values of EVA-copolymers with varying vinyl acetate content are investigated. Hereby, measurements are conducted in (1,2,4)-trichlorobenzene at a wavelength of 660 nm.

Acknowledgement: Lyondell Basell Polyolefine GmbH

References:
1Plastics Europe, An analysis of European plastics production, demand and waste data 2016.