Title: Specific solutions for specific problems – Analytical options beyond the standard (HT-GPC, TREF, DSC, …)

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Abstract:

Note: maximum length of 400 words.

To a chemist, polyolefins are, at least at first glance, just hydrocarbons, that is, compounds based on carbon and hydrogen. At most, there may be an oxygen included in the structure here or there, but, overall, they appear almost boring. Yet, this deceptively simple description hides a cornucopia of structural variations and compounds of highly varying properties. Often times, polyolefin characterization only brushes the surface of what is possible and actually present in a compound. By employing well-established analytical techniques such as high temperature gel permeation chromatography (HT-GPC), temperature rising elution fractionation (TREF) or dynamic scanning calorimetry (DSC) some basic characteristics (molar mass, chemical composition, melting temperature) are assessed. The results are typically deemed sufficient to characterize a given polyolefin compound. And then: next sample, please.

While this approach and the application of standard techniques are the bread and butter for analysts, things do become much more interesting when there is a need to look beyond the standard array of approaches for polyolefin characterization. Either because some specific structural variation needs to be characterized or because polymer behavior under very specific circumstances is relevant in certain use cases.

In this talk, such less common analytical problems and the exact techniques employed to solve them will be explored. Technique-wise, this will include detection options for HT-GPC, assessment of phase transitions in solid-liquid equilibria and hyphenated separation approaches for assessing interdependencies such as between chemical composition and molar mass. Each approach will be highlighted with a use-case example, illustrating the specific benefits and application range as well as show-casing the particular need for each of the portrayed, more sophisticated analytical approaches.