

Product Design: Thermal Analysis in the Elastomer and Tire Industry

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ABSTRACT

In this contribution, we want to describe a number of interesting application examples that demonstrate the use of thermal analysis techniques in the tire and elastomer industry. These have mainly to do with the measurement and testing of physical properties of tire tread compounds and the prediction of tire properties.

Typical examples include:

- the identification of polymers by their glass transition temperature;
- crystallization and melting processes;
- compositional analysis and decomposition behavior;
- the determination of dynamic mechanical properties such as the loss factor or the complex modulus as a function of temperature, frequency or the displacement amplitude
- identification of elastomers by hyphenated techniques.

Many properties of elastomers, such as the dynamic-mechanical behavior are influenced significantly by the crystallinity and the crystallization kinetics. We show how fast scanning calorimetry (Flash DSC) can be used to characterize the kinetics of crystallization. One focus of our investigations is on the characterization of the crystallization behavior of typical tire elastomers such as polybutadiene.