

Joseph D. Menczel and R. Bruce Prime (eds): Thermal analysis of polymers fundamental and applications

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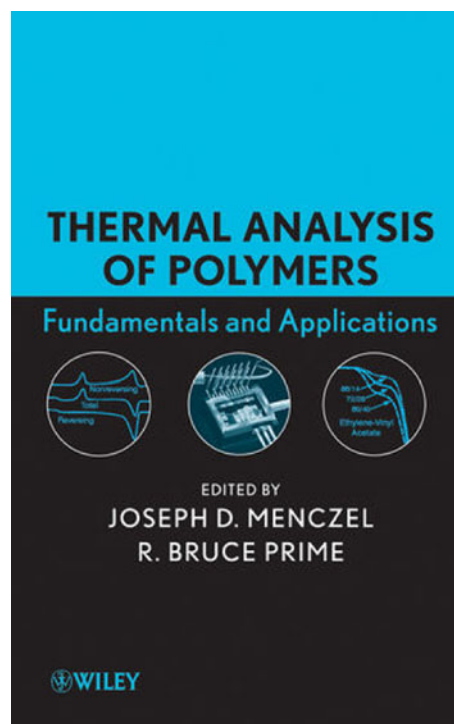
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This book is devoted to the introduction of thermoanalytical methods, which are applied for characterization of polymeric materials. This compilation provides balanced insight into the basic principles of the different techniques as well as into the recent technical development of instrument producing companies. Although, the fundamental principles of thermal analysis did not change considerably during the past decades, the technical development of the equipments was extremely fast in these times. With respect to that, I think that the detailed introduction of technical solutions is important and useful.

This book is divided into seven large chapters. All chapters are built up in a similar and logical way. The measurement principles are discussed at the beginning and the equipments are presented in details. Finally, the practical use of the discussed techniques is presented.

The first section (Chap. 2) discusses differential scanning calorimetry (DSC) written by Joseph D. Menczel, Lawrence Judovits, R. Bruce Prime, Harvey E. Bair, Mike Reading, and Steven Swier. I would like to point out those sections of Chap. 2, which are focused on practical use of this technique. Moreover, I have to bring into relief that the content of this chapter is supported by 126 figures, which are presenting mostly real-life experimental results. I have to remark that unfortunately the authors have not presented stepwise isothermal segregation technique (SIST), which is an important method in the characterization of molecular architecture of crystalline polymers and copolymers and provides valuable information about the distribution of chain defects and/or comonomer along the polymer chains.

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Moreover, the pioneering work of Prof. Vincent B. F. Mathot concerning the fast scan calorimetry would have been mentioned as well.

Chapter 3 is devoted to introduce thermogravimetry (TG), which is one of the oldest thermoanalytical methods. This section is written by R. Bruce Prime, Harvey E. Bair, Sergey Vyazovkin, Patrick K. Gallagher, and Alan Riga. All of these authors have enormous experience in this field and consequently they have written an outstanding and actual summary of TG technique in nutshell, which was supported by 40 figures. Let me call the attention of the readers to the useful and clear discussion of kinetic

evaluation of TG curves, wherein the authors have pointed out that the kinetic calculations based on experiments at single heating rate should be handled with caution. I think that more researchers, who use the manufacturers' software for calculation of kinetic parameter, should read this section carefully. It would be more useful to review the coupled techniques [like TG-Mass Spectrometry (TG-MS), TG-FTIR, and TG-DTA] in details which field is the most dynamically developing ones recently.

The following section (Chap. 4) introduces thermomechanical analysis (TMA) and thermodilatometry (TD) by Harvey E. Bair, Ali E. Akinay, Joseph D. Menczel, R Bruce Prime, and Michael Jaffe. This outstanding chapter introduces all necessary knowledge to those, who are beginner or advanced users of these techniques. The description of application covers all fields, wherein this technique is usually applied.

Chapter 5 is devoted to dynamic mechanical analysis (DMA) written by Richard P. Chartoff, Joseph D. Menczel, and Steven H. Dillman. DMA is one of the most powerful techniques to characterize relaxation processes in polymeric materials. The theoretical background of this method is introduced fully and clearly at the beginning of this chapter. The merit of this chapter is the detailed description of DMA measurement techniques, because most of them are not self-explanatory measurements. Moreover, the authors have included detailed specifications of equipments available on the market, which is very important data for the potential buyers.

Dielectric analysis (DEA) as an important field is elaborated in Chap. 6 by Aglaia Vassilikou-Dova and Ioannis M. Kalogeras. Although, DEA is not the most frequently applied thermoanalytical method, this book cannot be completed only if this method is introduced in this book as well. The concept of this excellent chapter is similar to that of the others and contains all necessary knowledge and up-to-date information about DEA technique.

Last but not least the micro- and nano-scale local thermal analysis techniques are presented by Valeriy V. Gorbunov, David Grandy, Mike Reading, and Vladimir V. Tsukruk in Chap. 7. This interesting chapter introduces those measurement techniques, which are studying locally material properties like hot-stage microscopy methods (PLM, SEM, and AFM).

In general, it can be stated that this book is a valuable piece of work. I have read it with great pleasure and it is my honor to provide this short review. Let me congratulate the editors on the concept of this book. They managed to tune the balance between basic principles and practical information finely. Moreover, the whole structure of this book is homogeneous, thanks to the editors and to the Authors, who are appearing in more than one chapter. Last but not least, I have to point out the courteousness of the editors, because they have included in the acknowledgements Prof. Judit Simon and Bernhard Wunderlich as well. In conclusion I think that this book is very useful for students, PhDs, and researchers who are dealing or intended to deal with thermal analysis of polymers.