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Scanning Calorimeters; 2.6. Measurement of Heat Capacity; 2.7. Phase Transitions in Amorphous and Crystalline Polymers; 2.8. Fibers; 2.9. Films; 2.10. Thermosets; 2.11. Differential Photocalorimetry (DPC); 2.12. Fast-Scan DSC 2.13. Modulated Temperature Differential Scanning Calorimetry (MTDSC) 2.14. How to Perform DSC Measurements; 2.15. Instrumentation; Appendix; Abbreviations; References; 3 THERMOGRAVIMETRIC ANALYSIS (TGA); 3.1. Introduction; 3.2. Background Principles and Measurement Modes; 3.3. Calibration and Reference Materials; 3.4. Measurements and Analyses; 3.5. Kinetics; 3.6. Selected Applications; 3.7. Instrumentation; Appendix; Abbreviations; References; 4 THERMOMECHANICAL ANALYSIS (TMA) AND THERMODILATOMETRY (TD); 4.1. Introduction; 4.2. Principles and Theory; 4.3. Instrumental; 4.4. Calibration 4.5. How to Perform a TMA Experiment 4.6. Key Applications; 4.7. Selected Industrial Applications (with Details of Experimental Conditions); Appendix; Abbreviations; References; 5 DYNAMIC MECHANICAL ANALYSIS (DMA); 5.1. Introduction; 5.2. Characterization of Viscoelastic Behavior; 5.3. The Relationship between Time, Temperature, and Frequency; 5.4. Applications of Dynamic Mechanical Analysis; 5.5. Examples of DMA Characterization for Thermoplastics; 5.6. Characteristics of Fibers and Thin Films; 5.7. DMA Characterization of Crosslinked Polymers 5.8. Practical Aspects of Conducting DMA Experiments 5.9. Commercial DMA Instrumentation; Appendix; Abbreviations; References; 6 DIELECTRIC ANALYSIS (DEA); 6.1. Introduction; 6.2. Theory and Background of Dielectric Analysis; 6.3. Dielectric Techniques; 6.4. Performing Dielectric Experiments; 6.5. Typical Measurements on Poly (Methyl Methacrylate) (PMMA); 6.6. Dielectric Analysis of Thermoplastics; 6.7. Dielectric Analysis of Thermosets; 6.8. Instrumentation; Appendix; Abbreviations; References; 7 MICRO- AND NANOSCALE LOCAL THERMAL ANALYSIS; 7.1. Introduction; 7.2. The Atomic Force Microscope 7.3. Scanning Thermal Microscopy 7.4. Thermal Probe Design and Spatial Resolution; 7.5. Measuring Thermal Conductivity and Thermal Force-Distance Curves; 7.6. Local Thermal Analysis; 7.7. Performing a Micro/Nanoscale Thermal Analysis Experiment; 7.8. Examples of Micro/Nanoscale Thermal Analysis Applications; 7.9. Overview of Local Thermal Analysis; Abbreviations; References; INDEX

Sommario/riassunto

Presents a solid introduction to thermal analysis, methods, instrumentation, calibration, and application along with the necessary theoretical background. Useful to chemists, physicists, materials scientists, and engineers who are new to thermal analysis techniques, and to existing users of thermal analysis who wish expand their experience to new techniques and applications. Topics covered include Differential Scanning Calorimetry and Differential Thermal Analysis (DSC/DTA), Thermogravimetry, Thermomechanical Analysis and Dilatometry, Dynamic Mechanical Analysis, Micro-Thermal Ana