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Nota di contenuto

Fundamental of polymers and glasses / Connie B. Roth and Roman R. Baglay -- Structural recovery and physical aging of polymeric glasses / Sindee L. Simon and Gregory B. McKenna -- Glass transition and relaxation behavior of supercooled polymer melts: an introduction to modeling approaches by molecular dynamics simulations / Jorg Baschnagel, Ivan Kriuchevskyi, Julian Helfferich, Celine Ruscher, Hendrik Meyer, Olivier Benzerara, Jean Farago, and Joachim P. Wittmer -- Thermo-mechanical signatures of polymeric glasses / James M. Caruthers and Grigori A. Medvedev -- Correlating glass transition and physical aging in polymer films / Connie B. Roth, Justin E. Pye, and Roman R. Baglay -- Mechanical and viscoelastic properties of polymer thin films and surfaces / Gregory B. McKenna and Meiyu Zhai -- Glassy and aging dynamics in polymer films investigated by dielectric relaxation spectroscopy / Koji Fukao -- Cooperative motion as an organizing principle for relaxation in supported thin polymer films / Paul Z. Hanakata, Beatriz A. Pazmino Betancourt, Jack F. Douglas, and Francis W. Starr -- Mechanical properties of polymers and nano-composites close to the glass transition / Alain Dequidt, Didier R. Long, Samy Merabia, and Paul Sotta -- A molecular perspective on the yield and flow of polymer glasses: the role of enhanced segmental dynamics during active deformation / Mark D. Ediger and Kelly Hebert -- Local relaxation, aging, and memory of polymer glasses at rest and under stress / Jorg Rottler -- Experiments-inspired molecular modeling of yielding and failure of polymer glasses under large deformation / Shi-Qing Wang and Shiwang Cheng -- Modeling strain hardening in polymer glasses using molecular simulations / Robert S. Hoy -- A comparison of constitutive descriptions of the thermo-mechanical behavior of polymeric glasses / Grigori A. Medvedev and James M. Caruthers.

Sommario/riassunto

"the present book will be of great value for both newcomers to the field and mature active researchers by serving as a coherent and timely introduction to some of the modern approaches, ideas, results, emerging understanding, and many open questions in this fascinating field of polymer glasses, supercooled liquids, and thin films" –Kenneth S. Schweizer, Morris Professor of Materials Science & Engineering, University of Illinois at Urbana-Champaign (from the Foreword). This book provides a timely and comprehensive overview of molecular level insights into polymer glasses in confined geometries and under deformation. Polymer glasses have become ubiquitous to our daily life, from the polycarbonate eyeglass lenses on the end of our nose to large acrylic glass panes holding water in aquarium tanks, with advantages over glass in that they are lightweight and easy to manufacture, while remaining transparent and rigid. The contents include an introduction to the field, as well as state of the art investigations. Chapters delve into studies of commonalities across different types of glass formers (polymers, small molecules, colloids, and granular materials), which have enabled microscopic and molecular level frameworks to be developed. The authors show how glass formers are modeled across different systems, thereby leading to treatments for polymer glasses with first-principle based approaches and molecular level detail. Readers across disciplines will benefit from this topical overview summarizing the key areas of polymer glasses, alongside an introduction to the main principles and approaches.