Physical Properties of Polymers Handbook

Second Edition

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Edited by

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Springer

Library of Congress Control Number: 2005938500

ISBN-10: 0-387-31235-8
ISBN-13: 978-0387-312354

Printed on acid-free paper.

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Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

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Preface to the Second Edition

As before, the goal of this handbook is to provide concise information on the properties of polymeric materials, particularly those most relevant to the areas of physical chemistry and chemical physics. The hope is that it will simplify some of the problems of finding useful information on polymer properties.

All of the chapters of the first edition were updated and 11 entirely new chapters added. Four of them focus on novel polymeric structures, specifically dendrimers, polyrotaxanes, foldamers, and supramolecular polymers in general. Another group of chapters covers reinforcing phases in polymers, including carbon black, silica, clays, polyhedral oligomeric silsesquioxanes (POSS), carbon nanotubes, and relevant theories. The final new chapter describes experiments on single polymer chains.

It is a pleasure to acknowledge with gratitude the encouragement, support, and technical assistance provided by Springer, particularly David Packer, Lee Lubarsky, Felix Portnoy, and, earlier, Hans Koelsch. The editor also wishes to thank his wife Helen for the type of understanding and support that helps get one through book projects of this complexity.

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September 2006

Preface to the First Edition

This handbook offers concise information on the properties of polymeric materials, particularly those most relevant to the areas of physical chemistry and chemical physics. It thus emphasizes those properties of greatest utility to polymer chemists, physicists, and engineers interested in characterizing such materials. With this emphasis, the more synthetic–organic topics such as the polymerization process and the chemical modification of polymers were considered beyond its scope.

The contributors to this handbook have endeavored to be highly selective, choosing and documenting those results considered to have the highest relevance and reliability. There was thus no attempt to be exhaustive and comprehensive. The careful selection of the results included, however, suggests it should nonetheless provide the great majority of topics and data on polymer properties likely to be sought by members of the polymer community. Extensive indexing should facilitate locating the desired information, and it is hoped that the modest size of the handbook will give it considerable portability and wide availability.

Every attempt has been made to include modern topics not covered in a convenient handbook format elsewhere, such as scaling and fractal dimensions, computational parameters, rotational isomeric state models, liquid–crystalline polymers, medical applications, biodegradability, surface and interfacial properties, microlithography, supercritical fluids, pyrolyzability, electrical conductivity, nonlinear optical properties, and electroluminescence.

All contributions to this volume were extensively reviewed by a minimum of two referees, to insure articles of the highest quality and relevance. Many of the reviewers were chosen from the Editorial Board of the *AIP Series in Polymers and Complex Materials*, of which this handbook is a part. Their important contributions are gratefully acknowledged, as are those of the Editors-in-Chief of the Series, Ronald Larson and Philip A. Pincus. One Editorial Board member, Robert E. Cohen, deserves special acknowledgment and sincere thanks. He not only originated the idea of doing a handbook of this type, but also contributed tremendously to its realization. Charles H. Doering and Maria Taylor (and earlier, Zvi Ruder) also provided unfailing support and encouragement in this project. It has been a distinct pleasure working with them and other members of the AIP Press: K. Okun, K. S. Kleinstiver, M. Star, and C. Blaut. The editor also wishes to thank his wife Helen for the type of understanding and support that is not always easy to put into words.

Both the editor and contributors to this volume would feel well rewarded if this handbook helps relieve some of the problems of finding useful information on polymer properties in the ever-growing scientific literature.

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November 1995