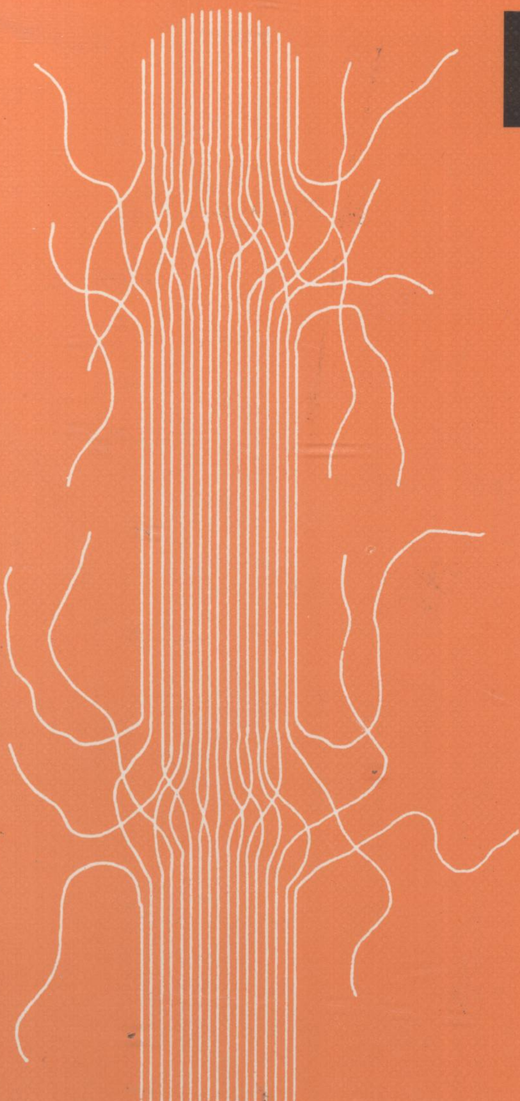
Stoyko Fakirov (Ed.)

# Oriented Polymer Materials



Hüthig & Wepf

# Oriented Polymer Materials

Edited by Stoyko Fakirov



With 337 Figures and 42 Tables



Hüthig & Wepf Verlag Zug · Heidelberg · Oxford CT/USA

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Die Deutsche Bibliothek – CIP-Einheitsaufnahme
Oriented polymer materials : with 42 tables / ed. by Stoyko Fakirov. – Basel ; Heidelberg ; New York : Hüthig und Wepf, 1996
ISBN 3-85739-123-5
NE: Fakirov, Stojko [Hrsg.]


ISBN 3-85739-123-5
Druck: Laub GmbH & Co., Elztal-Dallau
Buchbinderische Verarbeitung: IVB, Heppenheim

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# Preface

The orientation phenomenon is a basic inherent peculiarity of polymers, arising from the chain character of macromolecules and their ability to adopt different conformations — from a coil to an extended chain. The realization of these two extreme conformations or some intermediate ones determines to the greatest extent the mechanical properties of polymers as materials. In addition to the synthesis of new polymers, orientation is a basic approach to the obtaining of polymeric materials with superior properties. Incidentally, the outstanding mechanical properties of liquid crystalline polymers do not stem directly from their chemical composition, but are related to their unique ability of perfect orientation due to the peculiarities of their chemical composition.

The driving forces for the preparation of this book were the clear understanding of the importance of orientation itself and of the oriented polymeric materials, I met everywhere, as well as the fact that the last book related to this important topic appeared more then ten years ago. This situation was recognized somewhat earlier by other polymer scientists, too, and I am pleased to note here that this project was started, although in another form, by Dr. I. Moneva and some colleagues of ours from St. Petersburg, but the turbulent changes in the former Soviet Union and in the contries of Central and Eastern Europe affected it badly. Owing to the generous encouragement and support of Dr. R. E. Bareiss from *Die Makromolekulare Chemie*, the project was modified and could be materialized.

Although the chapters are not formally organized in larger units, an attempt is made to start the book with an overview of the orientation phenomenon, followed by chapters dealing with basic techniques for the study and characterization of orientation and oriented polymers. Another goal was to include as much as possible different representatives of oriented polymer materials, as well as approaches to the improvement of their mechanical properties. These two fields are by far not completely covered and many more contributions are required for doing so.

Like many books of this type, the present one suffers from the diversity of styles and ways of presentation of the chapters, but we hope that this disadvantage is compensated by the high professionalism of the co-authors and by the updated results they have offered. Here it should be mentioned that the chapters differ also in their volume, the contributions from the

Russian co-authors being the longest. The reason is that for many decades there were no equal opportunities for worldwide exchange of information, therefore research in the former Soviet Union did not have access to Western scientists. The review character of the two introductory chapters is an attempt to overcome partially this situation.

As editor, I wish to express my sincere gratitude to the individual contributors, because this type of publication requires perseverance and a great deal of patience. I am greatly indebted to my co-worker Mrs. S. Petrovich — without her everyday help this project could not have been undertaken. A special note of thanks to Dr. Z. Denchev for preparing the Author and Subject Indices as well as appreciation to the Bosphorus University in Istanbul for the hospitality offered to me during my sabbatical year when the book was finalized.

Sofia 1991 — Istanbul 1994

*S. Fakirov*
Editor

The book is dedicated to

***Professor Anton Peterlin*** *in recognition of his essential contribution to the understanding of orientation phenomena and oriented polymers.*

*Professor Peterlin was one of the most enthusiastic co-authors at the beginning of this project but, to our deep sorrow, he passed away before completing the chapter he had started on the influence of amorphous layers.*

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