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Progress in Understanding of Polymer Crystallization

 Springer

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Preface

The present volume of the Lecture Notes in Physics, entitled *Progress in Understanding of Polymer Crystallization*, originated from the series of biennial Discussion Meetings on Polymer Crystallization in the Black Forest initiated in 1999. The meetings were triggered by new experimental observations that cannot be treated within the framework of conventional wisdom. They were debated together with results of computer simulations and new theoretical approaches. Various new ideas are now emerging from these discussions that deserve to be presented in a connected manner and in written form. Based on a positive response from the participants, we decided to collect these findings and views in a volume of the *Lecture Notes in Physics*.

The compilation of contributions presented here covers all aspects of polymer crystallization, and includes general views, specific observations, and also comparisons with previously proposed concepts in order to set them into perspective to the currently discussed ideas. Thus, this compiled collection reflects the state of the art in polymer crystallization and deals with various topics:

- Novel general views and concepts that help to advance our understanding of polymer crystallisation.
- Nucleation phenomena.
- Long living melt structures affecting crystallization.
- Confinement effects on crystallization.
- Crystallization in flowing melts.
- Fluid mobility restrictions caused by crystallites.
- The role of mesophases in the crystal formation.

In the context of the above-listed topics, there are several questions still open and often controversially debated. They concern nucleation – *Which conditions are necessary to nucleate the polymer crystallization process?*. The applicability of thermodynamic concepts – *Do concepts of equilibrium thermodynamics such as “melting” and “crystallization” describe correctly the nonequilibrium metastable nature of polymer crystals?* Morphological

aspects – *How can morphological changes, which are observed during crystallization and melting of polymers, be interpreted?* And theoretical approaches – *How can general theories, developed for growth and relaxation phenomena, be applied or extended to crystallization of complex macromolecular systems?*

We sincerely hope that these Lecture Notes contribute to the progress of understanding of polymer crystallization, by providing a summary of the present state of the art to all active workers in the field and by raising the interest of newcomers.

Mulhouse, Freiburg,
June 2006

Günter Reiter
Gert Strobl

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