

## **Alexander Y. Grosberg and Alexei R. Khokhlov: Giant molecules: here, there, and everywhere, 2nd edn**

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This introductory book was written by two award-winning authorities and previous collaborators in the field (Grosberg and Khokhlov 1994), Alexander Y. Grosberg (b. 1949 in Moscow), Professor of Physics and Mathematics at New York University's Department of Physics and Center for Soft Matter Research, and Alexei R. Khokhlov (b. 1954 in Moscow), Head of Moscow State University's Chair of Polymer and Crystal Physics and Laboratory of Physical Chemistry of Polymers and Laureate of the Russian National Award (2007).

This book has undergone considerable evolution. The first version appeared in Russian in 1989 as part of the “Quantum bibliotheca”—a series of books widely read by both high school students and professors (Grosberg and Khokhlov 1989). The first English edition appeared in 1997 (Grosberg and Khokhlov 1997) and was used as a text or as supplementary material for courses at a number of universities. The authors have benefited from the numerous corrections, comments, and suggestions of readers in preparing this second English edition.

This clear, comprehensible, and often amusing book describes the basic facts, concepts, and ideas of polymer physics in simple, yet scientifically accurate terms in scientific, historical, esthetic, and cultural contexts. The authors, who are remarkably articulate and witty, considering that they are theorists, deliberately avoid the complexities of scientific language, restrict the mathematics to simple algebra and some freshman college calculus, but they admit that at times the physics is “quite sophisticated” (p. xiv). Convinced that intellectual beauty is one of the most astonishing features of science, they have “tried to demonstrate the beauty of polymer and biopolymer science” (p. xiv).

In their introductory chapter Grosberg and Khokhlov state, “If you know about the physics of polymers you will understand why they are so widely used in everyday life and in industry, as well as how they work in biology” (p. 3). To emphasize the parallel thinking between classic authors and scientists, the authors preface all but the first of the 14 chapters with one or more pertinent quotations from nonscientific sources such as the Grimm Brothers, Hans Christian Andersen, Miguel de Cervantes, Sir Walter Scott, A. A. Milne

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(*Winnie the Pooh*), and J. K. Rowling (*Harry Potter*). A “List of Suggested Further Reading” (4 pp.) includes books and articles as recent as 2009 classified into 13 categories. A six double-column-page index concludes the volume.

The new edition includes new chapters on polymer synthesis, protein folding, and polymer knots as well as new sections on molecular motors, semi-flexible and worm-like polymers, and it presents new and updated materials on contemporary topics such as “smart” materials and single molecule experiments with DNA (deoxyribonucleic acid). Replete with numerous chemical and mathematical equations and structural formulas, it includes 103 figures; 32 of these figures are in color and appear in three separate sections. About half of this edition is new. The authors decided not to include the CD ROM with computer simulations of polymers from the first edition because they felt that it was becoming obsolete too quickly.

According to Pierre-Gilles de Gennes (1932–2007), the 1991 Nobel Physics laureate, who wrote the foreword, “The two Russian authors have had the talent of writing [the book] in a simple style—avoiding most of the heavy formalism, which is beloved in countries of strong mathematical bias, such as Russia or France. I am convinced that it will play a very useful role in this context. Giant molecules are important in our everyday life. But, as pointed out by the authors, they are also associated with a culture. What Bach did with the harpsichord, [Werner] Kuhn and [Paul John] Flory did with polymers. We owe a lot of thanks to those who now make this music accessible” (p. viii).

*Giant Molecules* will be of great value to undergraduate and graduate students in physics, chemistry, biophysics, chemical and biomedical engineering, and polymer and materials science; advanced high school students; polymer scientists; and nonscientists interested in the physics of polymers and biopolymers. In the words of the authors, who take great pains to demonstrate the ubiquity of polymers, “it may interest anyone with general curiosity about the world” (p. xiii).

## References

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