Blast Furnaces (7), Other Iron and Steel Processes (6), Nonferrous Processes (5), Metallurgical and Fluid Dynamic Processes (6), Heat and Mass Transfer During Crystallization (9), Heat and Diffusion Treatment (7), Nuclear Reactors (4), Turbines and Combustors (4), Corrosion (4). Among these papers are some reviews of the state of the art, as well as original studies. The shortcoming of such a volume is the incoherence of nomenclature, symbols, and styles. In seminars, unfortunately, this is always the case. The expert and the novice will find interesting, informative, and useful information in this volume. Mathematical and computer modeling of various metallurgical systems and reviews of vertical two-phase countercurrent flooding and high-temperature technology in gas turbines are examples of these.

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Physical Properties of Liquid Crystalline Materials (Vol. 1)

Author	W. H. de Jeu
Publisher	Gordon and Breach Science Publishers, Inc., New York (1980)
Pages	144
Price	$39.00
Reviewer	Krishna Seshan

The author, de Jeu, gives an in-depth survey of the physical properties of the nematic liquid crystalline phase aimed at the professional scientist. He states in the preface that the nematic phase is phenomenologically well understood and that the book is about the nematic phase. The author draws heavily on his own research and has contributed his results to almost all the chapters. A brief summary of the various chapters follows.

In his introduction, de Jeu discusses the differences among the chiral, nematic, and smectic phases. The Maier and Saupe molecular statistical theory of the nematic phase with one order parameter S, he claims, is a good approximation.

Chapter 2 on sample preparation gives some practical examples of how the materials are to be handled including an elaborate procedure for cleaning glass substrates. Such procedures, de Jeu explains, are important to obtain special boundary conditions required in the study of the nematic phase. Presumably this is aimed at investigators who are new to the field.

Chapter 3 on magnetic susceptibility shows how the anisotropy in that property can be measured. de Jeu describes the Faraday-Curie method by which the susceptibility may be measured and discusses a molecular statistical model for explaining the anisotropy in magnetic susceptibility. The anisotropies of some dozen compounds are discussed.

Chapter 4 on refractive index discusses how this property can be measured using the Abbe double prism method. The author develops the connection between the refractive index and the polarizability. The refractive indexes of several nematogenic compounds are discussed.

Chapters 5, 6 and 7 deal with the dielectric permittivity, elastic constants, and viscosity coefficients of the nematic phase. Each chapter first reviews the theory and then presents experimental evidence on several common nematics such as PAA and MBBA. The references cited at the end are up to date and comprehensive.

The author does not specifically state who his audience is but treats the subject at an advanced level and assumes some reader familiarity with the topics discussed. The theoretical treatment is rigorous, even though the author claims that he presents a "poor experimentalist's theory." The conclusion from this is that his audience is the interested researcher desiring a review in this field.

It is a pity that the author does not discuss what is known or unknown about the other two phases, the smectic and the cholesteric phases of liquid crystals, and how the nematic phase properties may or may not extend to those phases. With the author's expertise in the field, one would expect that he could make such a generalization. From the reader's point of view, this is a serious omission. Another omission is that the author does not volunteer information on areas of prospective research and does not point to unsolved problems. Thus the novice researcher will find in this book strictly a review of the experimental facts about the physical properties of the nematic phase of liquid crystals, with special reference to the work done by the author at the Philips Research Laboratory in Eindhoven.

It appears that this book is the first volume in a series entitled *Liquid Crystal Monographs* edited by G. Gray of the University of Hull. However, there is no information about the other volumes in this series.

K. Seshan is an assistant professor specializing in electronic materials at the Department of Metallurgical Engineering at the University of Arizona. His research interests include the optical, electrical, and magnetic properties of semiconductors as well as thin films.