

## book reviews

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**Crystals that flow. Classic papers from the history of liquid crystals.** Compiled with translation and commentary by Tim J. Sluckin, David A. Dunmur and Horst Stegemeyer. **Liquid Crystals Book Series**, edited by G. W. Gray, J. W. Goodby and A. Fukuda. Pp. xxiii + 738. London: Taylor & Francis, 2004. Price (hardback) GBP 99. ISBN 0-415-25789-1.

The title of the book might enlighten some of the controversial disputes about the correct understanding of the new state of matter discovered in 1888. After the topic was first raised by the botanist Friedrich Reinitzer in 1888 along with the subject of cholesterol, the physicist Otto Lehmann in 1898 described 'Fließende Kristalle' (flowing crystals), but used the terms 'slimy liquid crystals', 'crystalline fluids' and 'liquid crystals which form drops' as well. Later Lehmann, in 1904, coined the phrase 'liquid crystals' (LC) for a state that is neither a proper crystal nor a proper liquid, but exhibits properties of both states. 'Anisotropic liquids' is also used as a term, which at least characterizes nematics better, which are now used in the multibillion-dollar display industry. In 1922, G. Friedel used the alternative terminology 'mesomorphic state of matter' for all these terms.

The three 'compilers' have done a very good job. They have collected what nowadays are called 'classic papers' of LC research up to 1978, they have translated articles not originally written in English into this language (in fact German and French

were the languages of early LC articles), and, most meritoriously, have made the complicated development of science in this field more transparent by adding well placed essays of introduction. Here the personal relationship between several key scientists is touched upon, e.g. the lifelong animosities of well accepted scientists like G. Tammann, G. Quincke and W. Nernst against the acceptance of LC, or the tragic life of the important Russian scientist V. K. Frederiks, the brother-in-law of the well known composer D. Shostakovich, who perished in Stalin's Gulag.

The book presents about 45 seminal papers, selected as is stated in the preface 'from the hundreds of papers that might be regarded as classic'. The book is divided into five sections; the first three sections and their commentaries are arranged in chronological order, and the fourth section is focused on application aspects, namely the development of LC displays. The fifth section covers lyotropic and polymeric liquid crystals as well as some colloidal aspects, reprinting papers of the Nobel Laureates R. Zsigmondy, L. Onsager and P. J. Flory.

For a crystallographer with an interest in historical views, in particular the initial sections (Section A: period from 1888 until about 1920; Section B: period between the wars; Section C: period of development of a modern physical picture, with an article by the Nobel Laureate P. G. de Gennes) are extremely informative, because many of the prominent members of the community, such as O. Lehmann, Ch. Mauguin, F. Grandjean and G. Friedel to mention just a few, contributed with pros and cons from the

earliest times. In 1905 van't Hoff tried to integrate the widespread views during the assembly of the German Bunsen Society in Karlsruhe. P. P. Ewald organized a sort of 'virtual' symposium between 1929 and 1931, publishing the papers in *Zeitschrift für Kristallographie*, Volume 79 (1931). A translation of the general discussion of that meeting is part of the book. Only two years later (1933), Sir W. Bragg and J. D. Bernal organized a meeting of the Faraday Society in London on 'liquid crystals and anisotropic melts'. Several articles published in the resulting *Transactions* are incorporated into the present book.

Because a living science cannot be classified unambiguously, the commentaries in front of each section (altogether about 130 pages) contain *nolens volens* some repetition. What is missing, not only from the viewpoint of a crystallographer, is the seminal contribution by the group of S. Chandrasekhar in Bangalore, who discovered the so-called discotic liquid crystals in 1977. A chemist might miss a paper by G. Brown, an outstanding promoter of LC research in the 1970s and 1980s.

The technical production of the book is very good. I could find only a few mistakes (e.g. the repetition of pages 435 and 535).

This book can be recommended to all interested in LC in the past and present and, also, to those who want to know what lies beyond the traditional crystallography.

**Wolfgang Haase**

Institut für Physikalische Chemie, Technische Universität Darmstadt, Petersenstr. 20, D-64287 Darmstadt, Germany