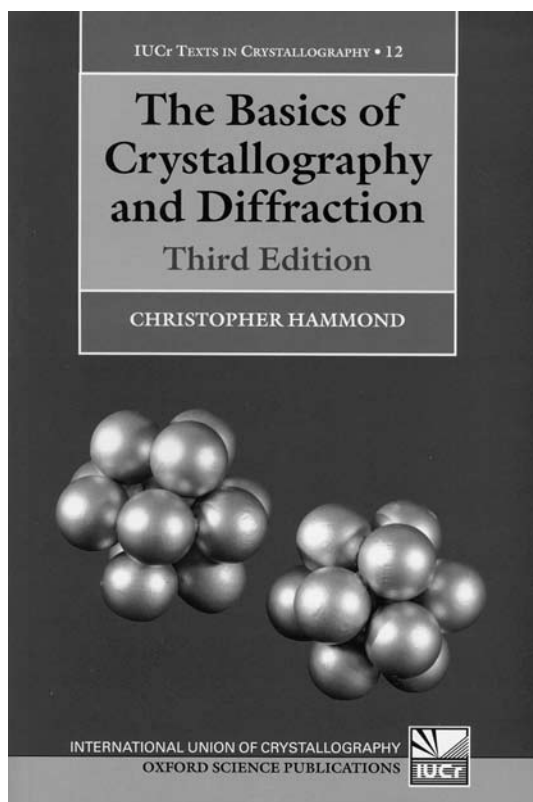


The basics of crystallography and diffraction (3rd ed.), by Christopher Hammond. Oxford University Press, Great Clarendon Street, Oxford, OX2 6DP Great Britain (order through: bookshop.uk@oup.com). 448 pages. Hardback: price GBP 60.00, USD 120.00; ISBN 978-0-19-954644-2. Paperback: price GBP 29.95, USD 60.00; ISBN 978-0-10-954645-9.



This introduction to crystallography, which is well edited and not expensive, is useful for students and teachers in a wide range of scientific disciplines (crystallography, crystal materials, chemistry and geology). It is an extended revision of the second edition (with almost one hundred pages more), and it also incorporates a new chapter devoted to Fourier analysis and imaging. The contents are organized into two parts. The first six chapters are dedicated to crystal chemistry and geometric crystallography, whereas the final seven chapters focus on X-ray diffraction.

The first part starts (Chapter 1) with an introduction to crystal chemistry, and deals with issues related to hexagonal and cubic close-packed structures, interstitial structures and the crystal chemistry of inorganic compounds and others. Chapters 2-4 are related to aspects of symmetry and crystal lattices. Chapter 2 treats the 2-D symmetry, the five plane lattices

and the seventeen plane groups. In addition, it presents other aspects like 1-D symmetry, symmetry in art and non-periodic patterns. Chapter 3 describes the fourteen space (Bravais) lattices, the crystal systems, and the space-filling polyhedra. Chapter 4 deals with 3-D symmetry: thirty-two crystal classes, inversion and translational symmetry elements, and space groups; it also presents brief information on crystal structures in organic compounds and quasicrystals. Chapters 5 and 6 complete the subject of crystallography, referring to lattice planes and directions in crystals with exposition of Miller indices, zone axis symbols and the reciprocal lattice.

In the second part, Chapter 7 presents the optical aspects of the nature and diffraction of light, and the geometry of the diffraction of light. Chapter 8 continues with X-ray diffraction, starting with the Laue equations and Bragg's law, and ending with the construction of the Ewald sphere. Chapters 9 and 10 describe the experimental aspects of X-ray diffraction and the intensity of diffracted X-ray and factor structure, single-crystal techniques (Laue method, methods of oscillation, rotation and precession), and diffraction in polycrystalline samples (determination of cell parameters, phase identification and others), ending with a brief description of the Rietveld method. Chapter 11 is an introduction to neutron diffraction, and describes the analysis and application of the electron diffraction patterns, electron backscattered diffraction (TEM and SEM), and image formation and resolution in TEM. Chapter 12 describes the stereographic projection and its applications in crystallography, the use of the Wulff net and stereographic projections of cubic and non-cubic crystals, whereas Chapter 13 deals with some aspects of Fourier analysis in crystallography, analysis of the Fraunhofer diffraction pattern, and the Abbe theory of image formation.

The text ends with additional information in six appendices: (1) useful components for

a crystallography model-building kit and supplier, (2) computer programs in crystallography, (3) biographical notes on crystallographers and scientists mentioned in the text, (4) some useful crystallographic relationships, (5) a simple introduction to vectors and complex numbers and their uses in crystallography, and (6) systematic absences (extinctions) in X-ray diffraction and double diffraction in electron diffraction patterns.

Although there is abundant literature with a content similar to this book, I think it is interesting to note the educational aspects of this text, bearing in mind that it is aimed at students who need basic knowledge. In this sense, the text is raised easily, and more complex mathematical concepts have been reduced considerably. The schemes are generally simple but very illustrative, which allows easy understanding of the theoretical concepts presented, such as images with balls (Figs. 1.3 to 1.13 and 4.21) or symmetrical patterns with ornamental motifs (Figs. 2.3, 2.9 and 2.20 to 2.22). Another interesting aspect are the exercises presented in each chapter, so that the reader can better acquire the theoretical notions. On the other hand, less common topics in basic crystallography (such as information on historical aspects) are included in the text; these are well docu-

mented in the biography of the mentioned authors (Appendix 3).

My only criticism concerns the order of the chapters. In my opinion, the chapter on crystal chemistry, with concepts such as twins, stacking faults and polytypes, is presented too early. It seems more appropriate to deal first with geometric crystallography and only later with crystal chemistry, following the scheme of classic text books like that of Bloss (1971). Furthermore, it seems pertinent that the information on the stereographic projection is presented at the end of chapter 5 (with the Miller indices, and zone axis symbols).

In short, I can highly recommend this work. It is well written and illustrated, and the information presented is very complete and properly presented, especially for beginners in crystallography and related disciplines.

Reference

Bloss, F.D., 1971. *Crystallography and crystal chemistry: an introduction*. Holt, Rinehart and Winston (Austin), 545 pp.

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