

Preface

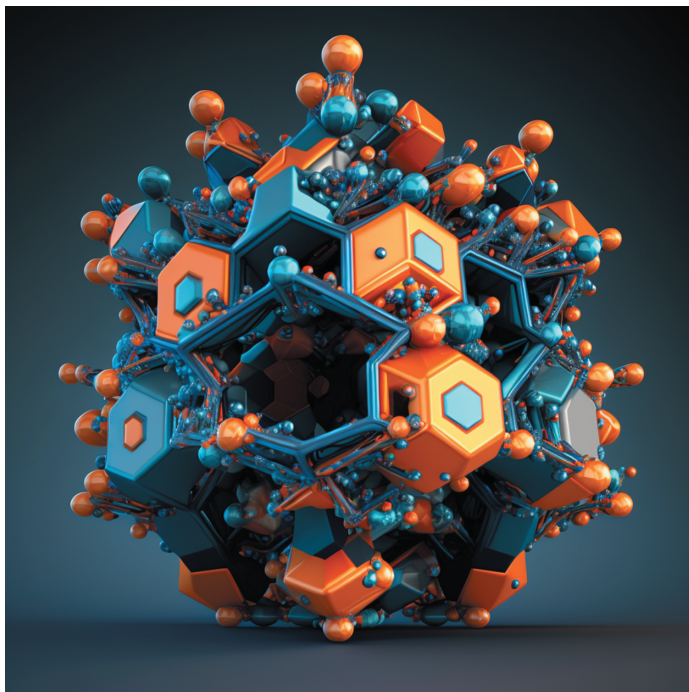
Dear reader,

You might ask: another book about solid-state chemistry! Why? The first answer could be: Because the author just could not resist the publisher's invitation to write a textbook on that subject. But that is not the whole story. It is not that there is a shortage of books on this topic, but the cross-cutting nature and the vast amount of research make it a worthy subject.

It might be also justified to ask whether textbooks are still needed at all. Aren't Wikipedia and the latest generation of AI tools like ChatGPT, Dall-e, and Midjourney sufficient? If you prompt ChatGPT for a short definition of solid-state chemistry, you will get the following answer:

Solid-state chemistry is the study of the chemical and physical properties of solids, including their synthesis, structure, bonding, and reactivity, with a focus on understanding the relationship between these properties and their applications.

That's an excellent answer, no question! But if you ask Midjourney to generate a picture of a "fancy crystal structure composed of various types of atoms, mainly colored in blue and orange, render look", this is what you get:



An interesting and beautiful image, indeed, but not a picture of a crystal structure. Maybe in the near future, the fusion of AI language tools with AI art creation tools is the answer to all questions! But I think that the decisive question is: Who will train the students to ask the right questions and to be able to evaluate the quality and correctness of the answers given by ChatGPT? And in this sense, this book should serve as a contribution to this goal.

You are invited to delve into fascinating structures and astonishing phenomena that occur in the solid state. You will gain a basic understanding of the systematics and principles of structures and their electronic, magnetic, and optical properties. In any case, special emphasis was placed on clear, high-quality illustrations and figures.

This small compendium offers a special selection of subjects, covering relevant topics, but without repeating all the basics from *general chemistry* that are already very well covered in many textbooks. The choice of the presented topics and the extent of their presentation have been made according to merely subjective assessments and may please some experts in the field as well as disappoint others – this cannot be avoided. And, last but not least, two topics in the area of solid-state chemistry that may be regarded as essential by others are not covered at all. Silicates except for zeolites are left out, because on the one hand it is a very comprehensive topic that deserves its own presentation, but is, on the other hand, from a conceptual point of view not very productive. Furthermore, lithium-ion batteries are not covered. However, I am always happy to receive wishes and ideas for updates in future editions. 😊

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Frank Hoffmann

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