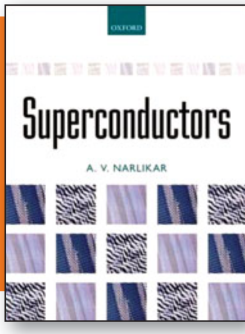

Superconductors

A.V. Narlikar

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Superconductors still fascinate both the scientific and engineering communities due to their wide potential applications, the fundamental physics of this macroscopic quantum state, and the quantum device/qubit architectures based upon them. It could be asked why another book is required for such a widely documented field, but Narlikar has written a comprehensive text from a relatively novel angle: that of materials science. This book is not intended to replace such legendary texts as the one by Tinkham, but comes into its own with a concise summary of the materials and techniques used to produce superconductors.

Chapter 1 gives a good history of the field, with chapters 2–6 reviewing the basics of superconductivity. These sections are clearly written and very complementary to the aforementioned fundamental text. They are also more approachable to readers from non-physics backgrounds than most texts. From chapter 7, the book comes into its own, summarizing the vast majority of superconducting materials and collecting them into groups that are described in more detail in the remaining chapters (8–21). It is also worth mentioning that chapter 17 details the thin-film technology behind the growth of high-temperature superconductors.

The book's organization makes it a handy reference; for example, if you want to know the basics behind organic semiconductors, there is a self-contained chapter dedicated to this topic, as well as chapters on pretty much any other superconducting system. The final chapter does an admirable job of citing the remaining few materials systems, such as metal dichalcogenides, that do not fit into previous chapters.

There are a few minor omissions. Perhaps the lack of mention of electric double-layer transistor-induced superconductivity is a bit of an oversight, but this is a very new specialized area. The periodic table of superconductors could have benefited from divisions of materials under pressure and those at atmospheric pressure. Diamond, silicon, and silicon carbide are also not included as superconductors at atmospheric pressure, due to the high levels of doping required to induce superconductivity. This is probably reasonable, with doping levels near 1% making them far from pure elemental superconductors. However, they are still diamond, silicon, and silicon carbide, and the approach used by the author almost relegates them to the footnotes. Perhaps the addition of a chapter on carbon-based or doped covalent superconductors could alleviate this issue in the future. This should not be considered a major flaw, however, as these superconductors are very new and not well understood.

Narlikar has done the field a service by compiling such a comprehensive text, which I hope will be well received and updated with many editions. This is still a fast-moving field, and anyone with even the slightest interest in superconductivity would benefit from having this text on his or her shelf, especially someone from a materials science background.

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