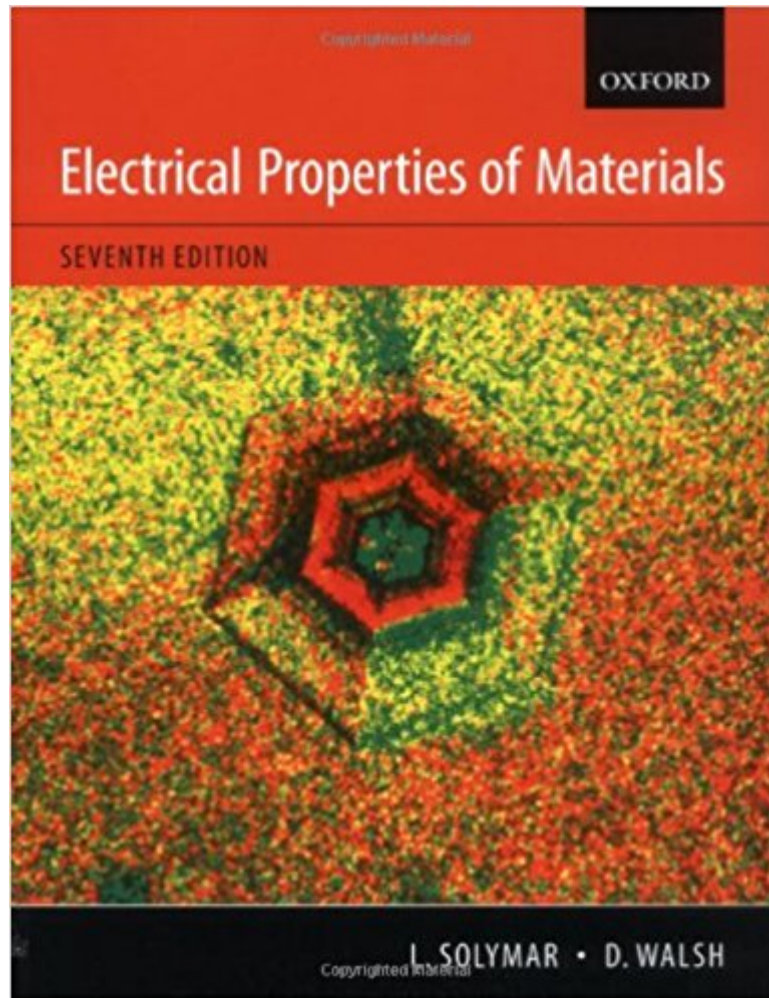




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# Electrical Properties Of Materials



## Synopsis

The seventh edition of this classic text illustrates the fundamentals of the electrical properties of materials in the context of contemporary engineering applications. Written in an informal, accessible style, it emphasizes the core ideas relevant to understanding the subject and deliberately keeps the mathematical treatment simple. The book presents the simplest model that can display the essential properties of a phenomenon and examines it, showing the difference between ideal and actual behavior. Topics are selected so that the operation of devices having applications (or possible future applications) in engineering can be explained. Problems and worked examples are included throughout.

Features of the Seventh Edition

- Presents a comprehensive treatment of light emitting diodes, which are rapidly replacing classical lighting sources
- Covers new topics such as organic material (including various polymers) and artificial materials (including photonic gap materials and metamaterials)
- Provides insight into cutting-edge fields such as amorphous semiconductors and nanotechnology
- Discusses new devices including nanotube transistors, single electron transistors, magnetic tunnel junctions, quantum cascade lasers, and ferroelectric and superconducting memories

A solutions manual and illustrations from the text are available for download at: <http://www.oup.com/uk/booksites/content/0199267936/>

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## Customer Reviews

...'this text illustrates the fundamentals of electrical properties of material with reference to contemporary applications in engineering...'. Materials World Incorporating International Mining and

Minerals. April 2004. `Review from previous edition "I found it easy to use as a textbook. There are very few mathematical difficulties." Niels Bohr Institute, Copenhagen` "... popular with students, largely because it is sprinkled with pleasant humour ... major strengths are in its sense of humour and its range ..." Materials Scientist, MIT` "... main strengths are clarity of presentation and the style of writing ... If there was a "bedtime reading" book on electrical properties then this is it!" Lecturer, Birmingham University` "The unique approach, accessible style and wide range of topics make this invaluable for undergraduate teaching." Physics Lecturer, Staffordshire University

Professor Laszlo Solymar and Dr Donald Walsh are both at the Department of Engineering, Oxford University, UK

i guess it is pretty decent

Along the way, Dr. Solymar proves time and time again that he has not mastered many of the chemistry and physics topics that he attempts to explain. The uncertainty relation is proved via an arbitrarily chosen width for a wave packet without mention of the correct way to derive this relationship (found in any number of quantum mechanics books), and the final uncertainty relationship is stated incorrectly. Bragg's relationship is stated wrong. I guess he does not care to differentiate between greater than or equal to and greater than; nor between  $h$  and  $\hbar$  (nor between the inclusion or exclusion of a factor of 2). However, for an introductory text, I would see it appropriate to get the equations and proof-approaches as correct as possible. If ugly algebra is what he is trying to avoid in this introductory text, he should at least provide the correct setups for each derivation, provide the relevant results, and guide the reader to alternative texts for a full-on mathematical work-up. Instead, what Dr. Solymar resorts to are cute, but useless stories, and arbitrary or unconventional approaches to 'prove' equations (usually not proofs at all, but a sequence of equalities showing that one result is consistent with another). You wouldn't use arithmetic rules and algebraic laws learned in secondary school to prove the more basic set theory (which can be derived from a basic set of axioms); nor would you use Pauli's exclusion principle to prove the form of a multi-particle wave equation for identical/indistinguishable particles. Yet Dr. Solymar does exactly this: 'prove' things in the wrong direction, or start at a certain arbitrary result (without making explicit the assumptions), using this random starting point to 'prove' a very critical result. Clear logic flow in this book is very much lacking. The book is however, rich in useless anthropomorphic analogies such as: "Perhaps melodrama would be the right category [to

characterize the Quantum Confined Stark Effect] considering the touching affection between electrons and holes. If we consider, however, how they stave off brutal intervention by the electric field with their backs against the potential wall, and how quickly all these things happen, then melodrama might give way to a thriller."Bad does not begin to explain this book. Overall, it is not impossible nor difficult to learn from this book. However, your understanding of how to interface your mathematical toolset to physical problems will have serious holes and flaws if you follow this book too closely. If you want a firm grounding in electronic materials, take a look at Simon M. Sze's books. You might also want to consider Charles Kittel's introductory text in solid state physics (much more mathematically involved than Solymar however). Finally, I could also recommend Banerjee (Solid State Devices), which is also sometimes verbose. However, in the case of Banerjee, the verbosity is always in an effort to describe the nuances of the subject rather than as in the case of Solymar, the verbosity is usually an attempt to make a fairytale masterpiece out of a technical subject. If you still have doubts about the quality of this book, please re-read the unedited quote I have taken out of the book above. If you want personified charge carriers, and violent electric fields, this book is perfect for you. This book is filled with enchanted and animated particles and forces and perilous land analogies you might expect in a fantasy book. I think for most, these ludicrous attempts at humor get old really fast and impede the reader's ability to get to the core of the concept.

I read this book for the first time in the university book store when shopping for a class. I ended up not taking the class, but the style was so accessible that I got a copy of the text anyway. It isn't a rigorous text as noted by another reviewer, however that reviewer I believe missed the point of the text completely. Somewhere I recall the audience was suggested to be 2nd year college student. Electrical Engineers rarely have had quantum mechanics by that point, if they take it at all. A course out of Kittel, Ashcroft and Mermin or similar would be needed first to truly be rigorous. The class that covers many of the topics in this book is a 400 level class at Cornell, one that assumes both solid state, and quantum as previous courses. Clearly no book that starts with what an electron is will get to how a superconductor in so few pages, in a rigorous manner. No the point of this text is to introduce some rules and wave one's hands a bit to see why they should be true. While a greater number of rules and postulates may be less satisfying to some, it can be ever bit as useful if you can remember them all. Solymar and Walsh do this. Not flawlessly, but in a text that is readable. Readability is important. This book is readable in the sense that Feynman's books are. The book is good for someone in another field or as a basic intro, as long as you understand you are getting a

sketch. Sketches are useful, this book is also. Recommended.

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