PHYSICS OF THIN-FILM PHOTOVOLTAICS

Tackling one of the hottest topics in renewables, thin-film photovoltaics, the authors present the latest updates, technologies, and applications, offering the most up-to-date and thorough coverage available to the engineer, scientist, or student.

It appears rather paradoxical that thin-film photovoltaics (PVs) are made of materials that seem unacceptable from the classical PV perspective, and yet they often outperform classical PV. This exciting new volume solves that paradox by switching to a new physics paradigm.

Many concepts here fall beyond the classical PV scope. The differences lie in device thinness (microns instead of millimeters) and morphology (non-crystalline instead of crystalline). In such structures, the charge carriers can reach electrodes without recombination. On the other hand, thin disordered structures render a possibility of detrimental lateral nonuniformities ("recombination highways"), and their energy spectra give rise to new recombination modes. The mechanisms of thermal exchange and device degradation are correspondingly unique.

The overall objective of this book is to give a self-contained in-depth discussion of the physics of thin-film systems in a manner accessible to both researchers and students. It covers most aspects of the physics of thin-film PV, including device operations, material structure and parameters, thin-film junction formation, analytical and numerical modeling, concepts of large area effects and
lateral non-uniformities, physics of shunting (both shunt growth and effects), and device degradation. Also, it reviews a variety of physical diagnostic techniques proven with thin-film PV. Whether for the veteran engineer or the student, this is a must-have for any library.

This outstanding new volume:

• Covers not only the state-of-the-art of thin-film photovoltaics, but also the basics, making this volume useful not just to the veteran engineer, but the new-hire or student as well

• Offers a comprehensive coverage of thin-film photovoltaics, including operations, modeling, non-uniformities, piezo-effects, and degradation

• Includes novel concepts and applications never presented in book format before

• Is an essential reference, not just for the engineer, scientist, and student, but the unassuming level of presentation also makes it accessible to readers with a limited physics background

• Is filled with workable examples and designs that are helpful for practical applications

• Is useful as a textbook for researchers, students, and faculty for understanding new ideas in this rapidly emerging field

Audience:

Industrial professionals in photovoltaics, such as engineers, managers, research and development staff, technicians, government and private research labs; also academic and research universities, such as physics, chemistry, and electrical engineering departments, and graduate and undergraduate students studying electronic devices, semiconductors, and energy disciplines

---

⚠️ ABOUT THE AUTHOR

**Victor G Karpov, PhD**, is a professor in the Department of Physics and Astronomy at the University of Toledo in the USA, having received his doctorate from Leningrad Polytechnical Institute. With almost 40 years of teaching and industry experience, he has published nearly 200 scholarly papers and has numerous grants and awards to his credit.

**Diana Shvydka, PhD**, is a professor in the Department of Radiation Oncology at the University of Toledo, having also received her doctorate from the University of Toledo. With almost 20 years of teaching and industry experience, she has published over 100 papers in scientific and technical journals and holds numerous patents.
To purchase this product, please visit https://www.wiley.com/en-gb/9781119651178