



# Materials Concepts for Solar Cells (Energy Futures)

*Thomas Dittrich*

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This textbook bridges the gap between basic literature on the physics of solar cells and highly specialized books about photovoltaic solar energy conversion. It is intended to give students with a background in engineering, materials science, chemistry or physics a comprehensive introduction to materials concepts for solar cells. To this end, general principles of solar cells and materials demands are explained in the first part of this book. The second part is devoted to the four classes of materials concepts for solar cells: solar cells based on crystals of silicon, epitaxial layer systems of III-V semiconductors, thin-film absorbers on foreign substrates, and nano-composite absorbers.

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### Contents:

- **Basics of Solar Cells and Materials Demands:**
  - Basic Characteristics and Characterization of Solar Cells
  - Photocurrent Generation and the Origin of Photovoltage
  - Influence of Recombination on the Minimum Lifetime
  - Charge Separation Across p-n Junctions
  - Ohmic Contacts for Solar Cells
  - Maximum Energy Conversion Efficiency of Solar Cells
- **Materials Specific Concepts:**
  - Solar Cells Based on Crystalline Silicon
  - Solar Cells Based on III-V Semiconductors
  - Thin-Film Solar Cells
  - Nano-Composite Solar Cells
- Appendix A: Solutions to Tasks

**Readership:** Advanced undergraduates and graduate students in photovoltaics.

### Key Features:

- Several case studies on insurgency included in this book
- Discusses the prevention of and responses to acts of terrorism and insurgency

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