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Abstract

Solar cell theory, materials, fabrication, design, modules, and systems are discussed. The solar source of light energy is described and quantified, along with a review of semiconductor properties and the generation, recombination, and the basic equations of photovoltaic device physics. Particular attention is given to p-n junction diodes, including efficiency limits, losses, and measurements. Si solar cell technology is described for the production of solar-quality crystals and wafers, and design, improvements, and device structures are examined. Consideration is given to alternate semiconductor materials and applications in concentrating systems, storage, and the design and construction of stand-alone systems and systems for residential and centralized power generation.

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