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Solar Energy Conversion

Solid-State Physics Aspects

Edited by B. O. Seraphin

With Contributions by

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With 209 Figures

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Preface

This book reviews key aspects of the materials science of solar energy conversion. The objective is an identification of problem areas in which a greater engagement of the solid-state physicist will improve existing technologies.

The involvement of the materials scientist may soon be of decisive importance. Solar energy conversion will contribute to future energy needs to the extent that existing devices can be improved in performance and lowered in cost. On the engineering level, most current approaches have been tried and perfected over the past 50 years without there being much hope for further improvements. However, a novel aspect has entered during the last two to three decades with the rapid development of the physics of solids which through their optoelectronic properties play a key role in major conversion schemes. Consequently, the greater involvement of modern solid-state physics will increase the chances to move solar technology beyond the barrier of economic marginality that now hinders its progress.

In its assessment of the current technology, this volume uncovers a disturbing discrepancy between the promise, as given by theoretical estimates for the performance, and the technology realized in existing devices. The size of the gap can be reduced by a greater engagement of the materials scientist. To attract his interest, an effort must be made to identify the key problem areas in which contributions from the solid-state physicist, the electrochemist, and the metallurgist may bring about novel solutions. Without a claim to completeness or comprehensiveness, this identification has been attempted here in areas of key importance for solar technology. The goal of this volume will be fulfilled if some of the reviews serve as a stimulation to further research in the solid-state aspects of solar energy conversion.

Tucson, Ariz., December 1978

B. O. Seraphin

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