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# **FUNDAMENTALS OF PHOTOVOLTAICS**

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This book is designed as teaching materials in physicist of semiconductor photoelectric converters and is based on the course of the lectures given by the authors at the Moscow Physics and Technology Institute. It reflects the modern state of the theory of photovoltaic effect and photoelectric energy conversion in semiconductors. A number of most fundamental problems have been considered covering various issues, from physics of photovoltaic effect to description and investigation of characteristics of particular photoelectric converters designs and methods of their efficiency optimisation.

Both conventional, two-layer structures with p-n junction, and more effective modern multi-layer structures have been studied, electronic properties of interfaces being taken into account.

The results of research of photovoltaic effect in inhomogeneous semiconductor layers have been presented that make it possible to find the ways of optimisation and substantial efficiency increase of real photoelectric structures in modern designs on the basis of metal-semiconductor contacts and in heterostructures that provide a modern design concept of solar cells with the highest, practically achievable, efficiency.

The electro-physical and optical characteristics of amorphous semiconductors and relatively inexpensive photoelectric converters on their basis have been considered. The results of research of the new highly effective photoelectric conversion method on the basis of bulk photovoltaic effect in inhomogeneous doped semiconductors have been presented. The theory of photovoltaic effect and energy conversion in semiconductors under concentrated radiation has been developed that has demonstrated the prospects of achievement of the highest possible efficiency of photoelectric converters corresponding to its thermodynamic limit.

The book is intended for researchers, engineers, postgraduates and the students whose sphere of interest is photoelectric conversion of solar energy.

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