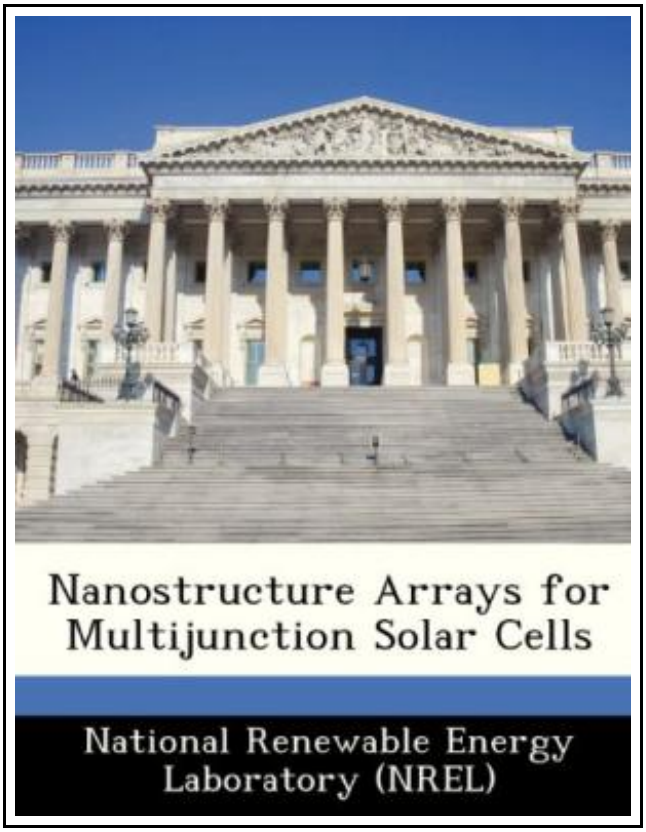
Nanostructure Arrays for Multijunction Solar Cells



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NANOSTRUCTURE ARRAYS FOR MULTIJUNCTION SOLAR CELLS

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Bibliogov, United States, 2012. Paperback. Book Condition: New. 246 x 189 mm. Language: English . Brand New Book ***** Print on Demand *****.This project developed the process technologies for the fabrication of high-efficiency multijunction photovoltaic cells using semiconductor nanostructure arrays. These devices are expected to provide increased energy conversion efficiency, as well as increased carrier collection efficiency. In addition, this approach provides the ability to tune the absorption spectrum to match selected windows of the solar spectrum. At the same time, these devices can be fabricated using existing industrial electrochemical processing techniques that can substantially reduce the cost of each device. The fabrication technique is based on electrochemical synthesis of II-VI semiconductor quantum wires using a preformed alumina template. This project focused on and solved the technical challenges that need to be addressed for the implementation of such devices. Specific issues addressed include (a) improved pore ordering on thin-film templates, (b) synthesis of II-VI semiconductor nanostructures by both AC and DC deposition, (c) an in-situ barrier-layer engineering process that allow the fabrication of superior-quality materials and improved template/substrate interface, (d) characterization techniques for templates, (e) process technology for creating stacked layers of nanostructures, (f) process throughput and improved apparatus, (g) modeling tools, (h) use of glass substrates, and (i) a nonlithographic surface texturing technique for silicon PV cells. An important outcome of this project is the demonstration of the fabrication technique on glass substrates. This breakthrough provides the possibility of covering buildings with transparent solar cells fabricated on architectural glass. The accomplishments of this project position it well for the next phase of research, namely, creation and optimization of the nanostructure-based PV cells.

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