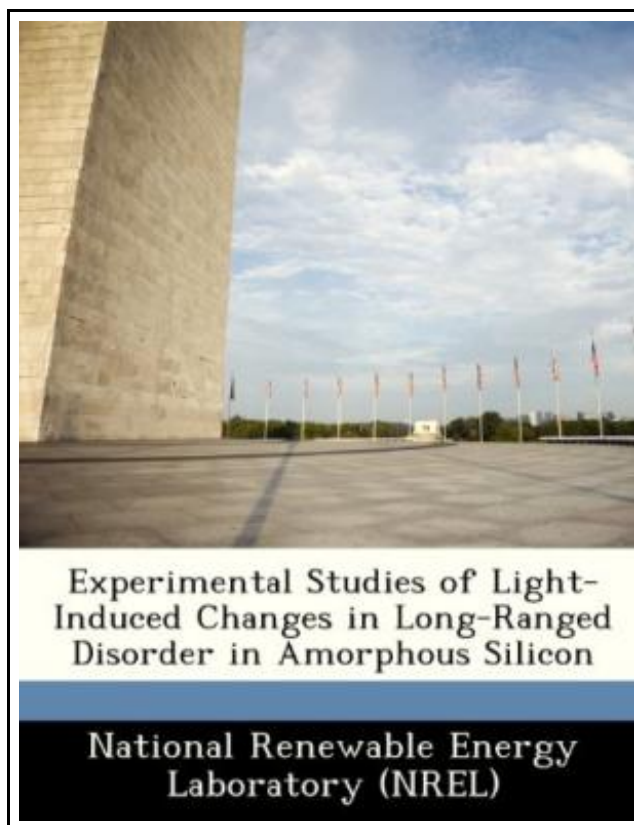


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EXPERIMENTAL STUDIES OF LIGHT-INDUCED CHANGES IN LONG-RANGED DISORDER IN AMORPHOUS SILICON



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Bibliogov, United States, 2012. Paperback. Book Condition: New. 246 x 189 mm. Language: English . Brand New Book ***** Print on Demand *****.The principal objective of the proposed research is the experimental study and elucidation of the role that long-ranged disorder plays in the light-induced metastable conductance changes in hydrogenated amorphous silicon (a-Si: H). The development of sources of low-cost renewable electrical energy is a high national priority. A consensus has developed that a-Si: H is the material of choice for large-area photovoltaic devices. However, the efficiency of a-Si: H-based solar cells decreases by nearly a factor of two following extended illumination, owing to the creation of light-induced defects resulting from the recombination of photo-excited charge carriers. If this light-induced defect formation could be reduced or eliminated, the practical conversion-efficiency of a-Si: H-based solar cells would effectively double, yielding cost per kilowatt-hour values comparable to that of conventional fossil fuel generation of electricity. Recent experimental results and theoretical calculations indicate that associated with light-induced dangling-bond creation, there are alterations in the medium- and long-ranged disorder in the a-Si: H films. A determination of whether or not the long-ranged disorder is affected in the Staebler-Wronski effect is important, for if so, then even when local defect generation is prevented, there could still remain metastable conductance changes that would affect photovoltaic device performance. Alternatively, if experimental studies clearly rule out light-induced changes in the long-ranged order in the a-Si: H film, then entire classes of models for the Staebler-Wronski effect can be eliminated from consideration. The results from this project indicate that the metastable conductance changes associated with the Staebler-Wronski effect can be understood solely in terms of models that involve only local changes in bonding coordination. Attempts to understand or control this phenomenon by altering the long-ranged disorder will not be...

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