INFLUENCE OF SURFACE CENTERS ON THE EFFECTIVE SURFACE RECOMBINATION RATE AND THE PARAMETERS OF SILICON SOLAR CELLS

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S u m m a r y

The results of our researches of the influence of exponentially distributed surface centers on the effective surface recombination rate and the parameters of silicon solar cells (SCs) are reported. In our calculations, we assumed the acceptor and donor surface states to lie in the upper and lower, respectively, parts of the bandgap. The model also supposed a discrete surface level to exist in the middle of the energy gap. In the case where the integrated concentration of continuously distributed centers is comparable with that of deep surface levels, those centers can affect the SC parameters only due to the recombination. If the concentration of continuously distributed centers is comparable or higher than the concentration characterizing a charge built-in into the insulator, those centers directly affect the surface band bending and the photo-induced electromotive force. With the help of a computer simulation, the conditions for the rate of surface recombination through continuously distributed surface centers to exceed that through the deep discrete level are determined. A decrease of the open-circuit voltage in inverted silicon SCs associated with the recombination through continuously distributed centers is calculated. The obtained theoretical results are compared with the experimental data.