

ANOMALOUS-SIGN PHOTO-EMF
IN MACROPOROUS SILICON AT PHOTON
ENERGIES COMPARABLE TO THAT
OF INDIRECT BAND-TO-BAND TRANSITION

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S u m m a r y

Experimental and theoretical temperature dependences of photo-emf generated in macroporous silicon at photon energies comparable to that of the indirect interband transition in silicon have been studied. The photo-emf was found to saturate or change its sign to negative at temperatures lower than 130 K owing to the light absorption due to phototransitions via surface states located closely to the conduction band in silicon. In this case, the surface band bending increases due to the growth of a negative charge of the semiconductor surface. Equilibrium electrons in the bulk and light-excited holes on the macropore surface recombine through the channel of multistage tunnel recombination between the conduction and valence bands.