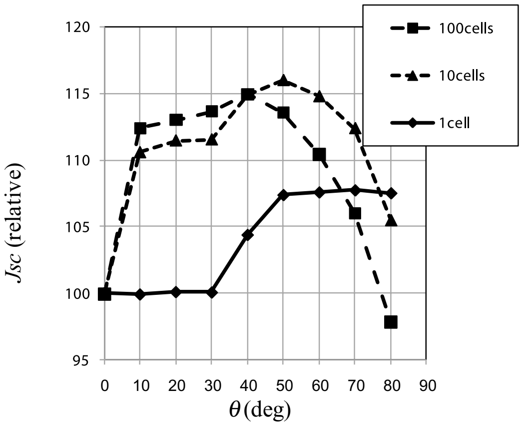

Fig. 6. Calculated J_{sc}(relative) as a function of θ.

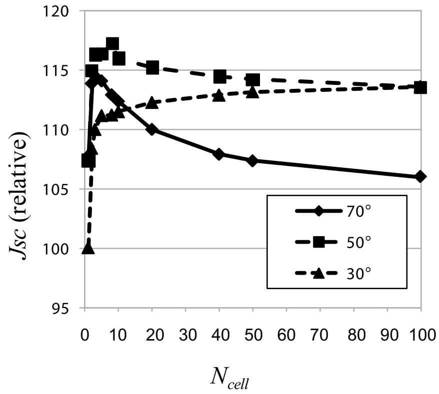

Fig. 7. Calculated J_{sc}(relative) as a function of N_{cell}.

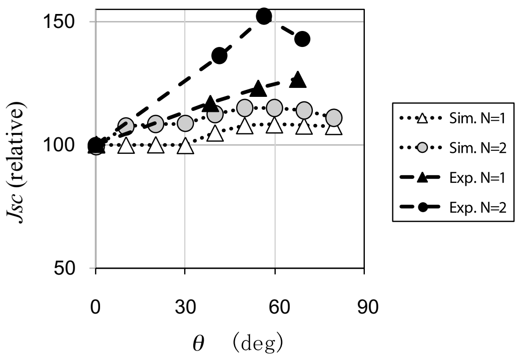

Fig. 8. Comparison of the results of the simulation and experiments.

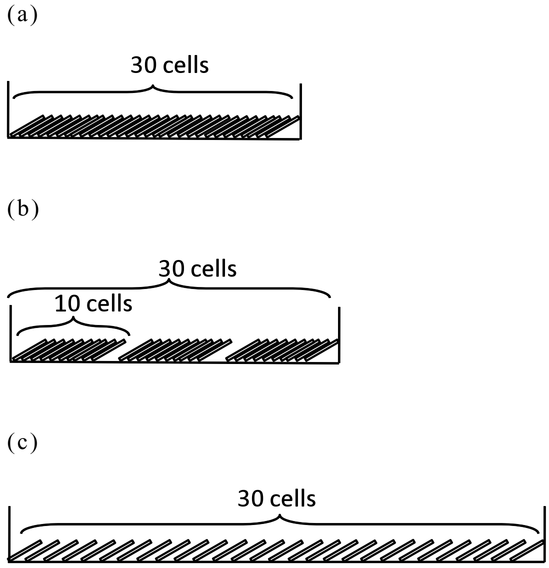

Fig. 9. Arrangements of practically large-sized modules using 30 cells with $\theta = 40^\circ$.

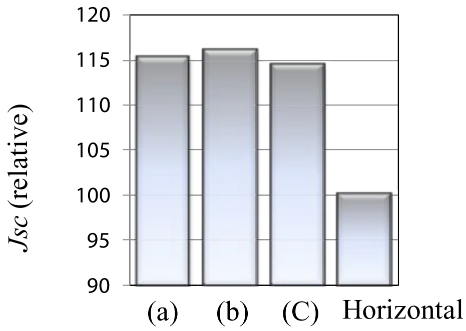

Fig. 10. Comparison of J_{sc}(relative) of the three arrangements shown in Fig. 9.

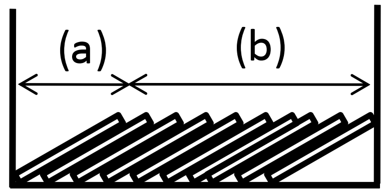

Fig. 11. Difference of the incident locations of the rays. (a) Upper surface, (b) cross-sections.

with the experimental values for each N_{cell} value. The experimentally observed highest J_{sc}(relative) was 150% at $\theta = 56^\circ$, $N_{cell} = 2$, that is considerably higher than the simulated value being 118%.

Arrangements for practically large-sized modules were evaluated by the simulation. Figure 9 illustrates three arrangements of the modules using 30 cells. The comparison of the resultant J_{sc}(relative) to that for the horizontal arrangement is shown in Fig. 10. The most significant improvement was achieved using Arrangement (b): by 16%. It is worth noting that J_{sc}(relative) of Arrangement (b) is a little higher than that of Arrangement (a), although the cell number per unit area in Arrangement (b) is fewer. This is practically of a great advantage for module cost reduction. The cell number per unit area can be significantly decreased by using Arrangement (c), with maintaining the J_{sc}(relative) value close to those of Arrangement (b). Therefore, this arrangement would provide the best cost-performance.

6. Discussion

The optimal value of N_{cell} depends on θ. This is due to the fact that the areal ratio of (a) and (b) shown in Fig. 11, where the light is incident from the upper surfaces and from the cross-sections, respectively, depends on both N_{cell} and θ.