The high efficiency solar cells require a rear passivation layer and local back contact in order to improve open-circuit voltage (V_{oc}) and short-circuit current (I_{sc}). In this study, thin films of Al_{2}O_{3} was applied as rear passivation and the laser patterning process conditions were varied to fabricate a solar cell with a local back contact structure. By applying the rear passivation, it can increase the open circuit voltage due to reduced rear recombination and increased carrier collection efficiency. Moreover, the optimization of open area leads to decrease contact resistance and rear recombination. In the case of laser patterns, the open circuit voltage increases as the opening area of the passivation increases. As a result, if the opening area is too large, recombination velocity and contact resistance increase and result in efficiency reduction. On the other hand, if the opening area is too small, the efficiency was deteriorated due to reduced carrier collection. Accordingly, it is important to optimize the rear passivation and laser patterns for high efficiency crystalline silicon solar cell. In this paper, the efficiency was increased from 17.4 to 18.7\% with optimization of open area and we obtained V_{oc} of 0.622V, J_{sc} of 37mA, fill factor of 81.3\% and cell efficiency of 18.709\% with Al_{2}O_{3} thin film passivation.

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