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Passivation Performance of Tunnel Oxide Passivated Contact Structure by Ozone Oxidation

In order to produce a high-efficiency solar cell, it is necessary to increase the passivation effect of the solar cell. Tunnel oxide passivated contact (TOPCon) cell prevents the recombination of carriers by selective carriers collection through tunnelling effect of a very thin silicon oxide layer. In this study, the passivation characteristics of the tunnel oxide layer were observed by growing the ultra-thin SiO_x layer with ozone oxidation. It was done under the O₃ environment at 300 to 500 °C with 10.5 to 21 wt% of concentration at 50 torr. The passivation effect of the SiO_x layer was compared with the J₀ and the implied Voc through quasi-steady-state photoconductance (QSSPC). Moreover, the sub-oxide ratio of the SiO_x layer was obtained from X-ray photoelectron spectroscopy (XPS) analysis. In order to evaluate the applicability of TOPCon cell, electrical characteristics were measured with polysilicon on oxide (POLO) junction. iVoc was measured to be 694mV which proved the applicability of TOPCon structure.

Primary author: Mr BAEK, JongHoon

Co-author: Prof. CHANG, Hyo Sik

Presenter: Mr BAEK, JongHoon

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