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# Comparing the Passivation Quality of Ozone and H2O Oxidant of Atomic Layer Deposited Al2O3 by Post-annealing in N2 and Forming Gas Ambients for Passivated Emitter and Rear Cell (PERC)

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The effect of rear passivation for passivated emitter and rear cell (PERC) using ozone and H2O oxidant of atomic layer deposited (ALD) Al2O3 was studied by post-annealing in N2 and forming gas ambients. Rear surface of PERC solar cell was passivated by Al2O3 grown by ALD with ozone and H2O oxidant. Al2O3 grown by ALD with ozone oxidant has been known to have many advantages, such as lower interface defects, low leakage current density. Its passivation quality is better than Al2O3 with H2O. Al2O3 layer with 10 nm and 20 nm thickness was grown at 150$^{o}$C with ozone oxidant and at 250$^{o}$C with H2O oxidant. And then each samples were post-annealled at 450$^{o}$C in N2 ambients and at 850$^{o}$C in forming gas ambients. The passivation quality was investigated by measuring the minority carrier lifetime respectively. We examined atomic layer deposited Al2O3 such as growth rate, film density, thickness, negative fixed charge density at AlOx/Si interface, and reflectance. The influences of process temperature and heat treatment were investigated using Sinton (WCT-120) by Quasi-Steady State Photoconductance (QSSPC) mode. Ozone-based ALD Al2O3 film shows the best carrier lifetime at lower deposition temperature than H2O-based ALD.

**Keywords:** ALD, Al2O3, passivation, lifetime