

The Gettering Effect of Boron Doped n-type Monocrystalline Silicon Wafer by In-situ Wet and Dry Oxidation

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To investigate the gettering effect of B-doped n-type monocrystalline silicon wafer, we made the p-n junction by diffusing boron into n-type monocrystalline Si substrate and then oxidized the boron doped n-type monocrystalline silicon wafer by in-situ wet and dry oxidation.

After oxidation, the minority carrier lifetime was measured by using microwave photoconductance and the sheet resistance by 4-point probe, respectively. The junction depth was analyzed by Secondary Ion Mass Spectrometry (SIMS). Boron diffusion reduced the metal impurities in the bulk of silicon wafer and increased the minority carrier lifetime. In the case of wet oxidation, the sheet resistance value of $\sim 46 \Omega/\square$ was obtained at 900°C , deposition time 50 min, and drive-in time 10 min. Uniformity was $\sim 7\%$ at 925°C , deposition time 30 min, and drive-in time 10 min. Finally, the minority carrier lifetime was shown to be increased from $3.3 \mu\text{s}$ for bare wafer to $21.6 \mu\text{s}$ for 900°C , deposition 40 min, and drive-in 10 min condition. In the case of dry oxidation, for the condition of 50 min deposition, 10 min drive-in, and O_2 flow of 2000 SCCM, the minority carrier lifetime of 16.3us, the sheet resistance of $\sim 48 \Omega/\square$, and uniformity of 2% were measured.

Keywords: Solar cell, n-type, Boron, Gettering, Oxidation