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Aluminium-BSF versus PERC solar cells: Study of rear side passivation quality and diffusion length

Abstract
The impact of (bulk) material and rear surface (contact) quality to the efficiency is found to be quite hard to measure on a processed solar cell. We will show with this paper that CELLO (solar cell local characterization) photo-impedance-spectroscopy measurements are capable of separating bulk from rear side effects on locally resolved maps. This study focuses on multicrystalline Aluminium-BSF solar cells which have been produced according to a co-firing parameter optimization process with a wide parameter space. It is found that the rear side recombination velocity on some locations of

the Al-BSF cell is much better than compared to PERC cells. Thus, the full potential of Al-BSF solar cells is much higher than usually expected and anticipated. In the future paste and co-firing optimizations are required to transfer the excellent local values of Al-BSF cells to the full cell area for excellent global values that result in cell efficiencies higher than today PERC solar cells. Thus, the time of Al-BSF solar cells is for our opinion not over yet.