

COMBINING THE ULTRA SIMPLIFIED SOLENNA_{||} CELL CONCEPT WITH N-TYPE CRYSTALMAX SILICON

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Bifacial solar cell n-PERT concept involves boron and phosphorus doped regions requiring both proper surface passivation. In order to reduce n-PERT technology related €/W_p, one way considered is to simplify cell process-flow. In order to do so, we developed passivating/ anti-reflective/ doping SiO_xN_y:B and SiN_x:P layers [1, 2]. The co-anneal of these multifunctional layers opens the door to the ultra-simplified SOLENNA_{||} technology providing up to 20.4%-efficient solar cells on n-type Cz. The present study aims also at implementing SOLENNA_{||} technology on CRYSTALMAX seed-assisted cast silicon. This low cost material can feature carrier lifetime values in the ms range and is therefore a good candidate for high efficiency / low-cost PV conversion. In this contribution n-type CRYSTALMAX silicon ingot features will be given. Then the assessment of the external gettering effect developed by the SiN_x:P layer will be presented, as well as final solar cell electrical parameters for devices combining CRYSTALMAX and SOLENNA_{||} technologies.



Figure 1: CrystalMax Gen 6 silicon ingot

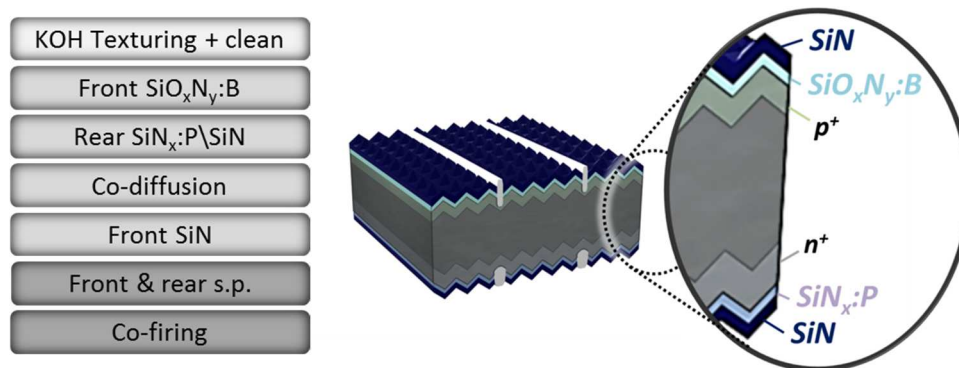


Figure 2: SOLENNA_{||} process flow and cell structure

[1] R. Cabal et al. "Solenna(3): The ultimate simplification of bifacial silicon technology, at a competitive cost/W_p", Photovoltaic Internationals, Edition n°31, March 2016

[2] R. Cabal et al. "20% N-Pert Solar Device in only 7 Steps: The Solenna(3) Concept" Proceedings of 32^d EU-PVSEC, Munich, 2016.