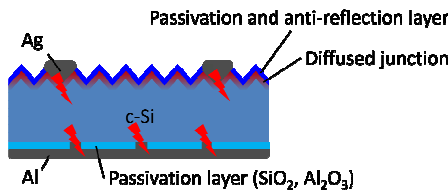


PASSIVATING CONTACTS FOR HIGH-EFFICIENCY SILICON SOLAR CELLS

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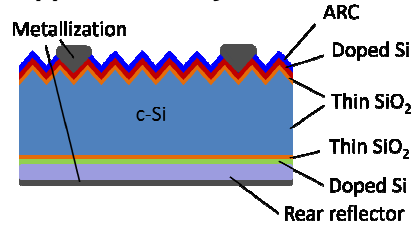
Motivation and Approach

Industrial Standard: PERC



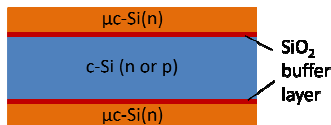
- State of the art in production is PERC = Passivated Emitter and Rear Cell
- Direct metal-silicon contacts are highly recombinative → open-circuit voltage (VOC) losses of ~50 mV [1]
- Requires structuring the rear side layer

Approach: Fully Passivated Surfaces

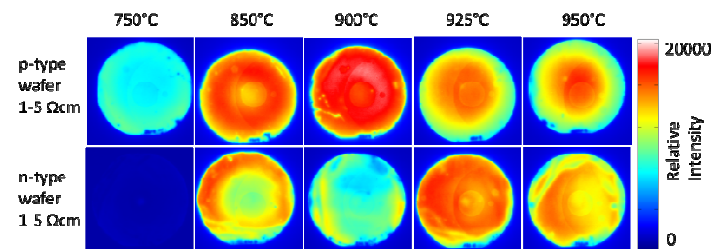
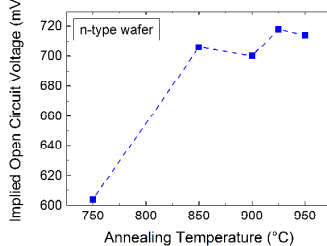
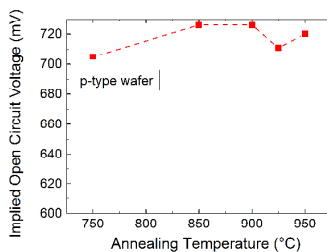


- Boost cell efficiency and simplify process
- Full-area passivating contacts
 - Voltage maximization
 - No need for patterning
- SiO₂ passivation layer is temperature stable → Compatible with the standard cell production sequence

Electron-Selective Contact



- Symmetrical test structure
- Preparation:
 - Growth of SiO_x buffer layer
 - Deposition of doped Si layer by plasma-enhanced chemical vapour deposition (PECVD)
 - Thermal annealing
- Minority carrier lifetime measured by photoconductance decay
- Homogeneity investigated by photoluminescence imaging
- Optimal anneal temperature for a dwell time of 6 min
- Optimum likely results from interplay between more pronounced in-diffusion of dopants at higher temperature and breakup of the chemical oxide [2,3]
- Photoluminescence image: Very good homogeneity over 4" wafer



References

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