Preface

SiliconPV 2023, the 13th international conference on crystalline silicon photovoltaics

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DOI
10.1016/j.solmat.2023.112653

Publication date
2024

Document Version
Final published version

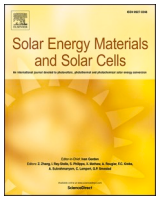
Published in
Solar Energy Materials and Solar Cells

Solar Energy Materials & Solar Cells 266 (2024) 112653

Contents lists available at ScienceDirect

Solar Energy Materials and Solar Cells

journal homepage: www.elsevier.com/locate/solmat



Editorial

Preface: SiliconPV 2023, the 13th international conference on crystalline silicon photovoltaics

The development of PV technology is going fast and much faster than one could dream of a decade ago, and efficiency is one of the key parameters to drive down the Levelized Cost of Electricity (LCOE). Crystalline silicon PV is often mentioned as the workhorse for large-scale deployment of PV. Actually, to my opinion it is more than a so-called workhorse: it is the core technology, and for at least the coming decade PV technology will be based on crystalline silicon. Currently, large manufacturers are converting their production lines from PERC^{+} to TOPCon enabling conversion efficiencies for solar cells beyond 26%. It has been demonstrated that these efficiencies are feasible in an industrial environment. More development is needed to obtain these efficiencies in high-volume manufacturing, which is a matter of time. Furthermore, many companies are investing in silicon heterojunction technology, another silicon PV technology with which efficiencies beyond 26% are possible. The current world record silicon solar cell with an efficiency of 26.8% is a heterojunction solar cell [1].

To make the next steps and reach efficiencies beyond the ones that are theoretically possible with single junction silicon PV we need tandem technology and especially the one of hybrid perovskite/silicon tandems; a concept containing silicon PV technology as bottom device. At the time of the conference the world record for a hybrid perovskite/silicon tandem cell was 32.5% [2]. Only 1.5 month after concluding the conference the world record has already been improved by more than 1% absolute to 33.7% [3]!!

With these ultra-high efficiencies, solar cells will become sensitive to already a low concentration of imperfections. A deeper understanding of, for example, degradation mechanisms, interface and surface passivation, and the behavior and properties of innovative module materials to guarantee long lifetimes are key. Process technologies, advanced characterization techniques and material properties to better understand the physics and chemistry behind these aspects were presented and discussed during this inspiring conference.

It was a great pleasure to meet with close to 300 scientists and engineers from all over the world during the conference that was held at the campus of Delft University of Technology (TU Delft). Many PV experts are acknowledged for reviewing abstracts and full manuscripts. The authors of twenty of the highest ranked abstract were invited to submit a full paper for this special issue of SolMat. We hope that you get new inspiration by studying these best papers of SiliconPV 2023 and will develop novel technologies that contribute to a fast energy transition. A better world will start with cheap and clean energy for everyone.

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https://doi.org/10.1016/j.solmat.2023.112653

Available online 9 December 2023