

Preface

Surface and interface recombination remains a major fundamental obstacle in achieving high-performance crystalline silicon photovoltaic devices. At the core of photovoltaic research is the understanding of charge dynamics at, or near surfaces and interfaces. The knowledge developed in this field over the past decades has been a major driver of solar cell efficiency improvement. It was already exploited in the 25% passivated emitter and rear cell (PERC) developed at UNSW in the 1980s which is now the dominant industrial silicon solar cell, and more recently by many researchers and laboratories worldwide in passivating contacts. From poly-silicon on oxide contacts enabling up to 26.1% efficiency (ISFH), to amorphous silicon heterojunctions enabling up to 26.7% efficiency (Kaneka), the exquisite simultaneous control of the interface passivation and charge flow has proven critical. In this Special Issue, we have gathered the latest experimental and theoretical developments in Surface and Interface Passivation in Crystalline Silicon Solar Cells. We are very happy that we were able to bring together the world-leading academics in this field, and covered a broad range of scientific advancement that will be of great service to our research community.

We would like to thank all the contributors in this Special Issue for the time and energy they put in producing such relevant and high-quality contributions. Most notably, we are grateful to our invited contributors for delivering their expertise in key topics that have impacted solar research vastly. These include the influence of silicon oxide layers (Prof Stefan Glunz), the use of carrier population control at surfaces (Prof Andres Cuevas), a perspective on passivation for crystalline silicon solar cells (Prof Jan Schmidt), the deployment of heterojunction solar cells (Prof Christophe Ballif), and lessons on the use of new passivation materials (Prof Erwin Kessels). The level of contribution they brought to this Special Issue is second to none globally, and it makes this a unique compilation in the field.

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