

Perovskite solar cells towards commercialization

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Abstract

Perovskite solar cells have been made great progress over the last six years. At the same time there are still number of issues to solve in order to make solar panels with perovskite which last over 20 years. CSEM aims to up-scale perovskite solar cells, develop encapsulation process for stable perovskite single junction, and achieve high efficiency through tandem devices with silicon solar cells thanks to our activities of silicon heterojunction solar cells.

The first perovskite modules patterned by laser process was demonstrated by CSEM^[1]. We have optimized charge transport materials, laser process and module design in order to improve efficiency and geometric fill factor (GFF). We demonstrate the efficiencies over 16% in N-i-P modules^[2] and 13% in P-i-N modules with an aperture area of 14 cm² and GFF over 95%. Regarding encapsulation of perovskite solar cells, we have applied conventional encapsulation process which has been used for Si solar cells for the perovskite solar cells, tailored the formulation of encapsulant materials to avoid losing the initial performance and investigated stability properties. Furthermore highly efficient 2-terminal perovskite/Si tandems are explored. We demonstrate a 57.4 cm² tandem device based on a 2-busbar design with an aperture efficiency of 22.6%.^[3]

References

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Biography

Soo-Jin Moon received her PhD from Chemistry and Chemical Engineering, Swiss Federal Institute of Technology, Lausanne (EPFL) in 2011. She has been working at Swiss Center for Electronics and Microtechnology (CSEM) as a senior engineer since 2013. She is the author of over 40 peer-reviewed papers and her research interests are on materials for energies such as solar cells, batteries and characterization of the devices and materials.