**Link:** <https://solar-power-tech.com/e-posters/psc_eposter_02/>

**Abstract**

Perovskite solar cells (PSCs) have experienced a rapid development during the past decade. Regular n-i-p PSCs have reached already a power conversion efficiency (PCE) of 25.5 %, which is comparable to the PCE of commercial crystalline silicon technology. ([NREL 2021](#_ENREF_2)) This outstanding efficiency evolution has been attracting much attention from the scientific and industrial community. However, most of the reported or certified PSCs with high-efficiency values are still limited to a small active area (< 1 cm2). PSC technology transition from laboratory to industrial scale is mandatory to make possible its commercialization. For that, large area perovskite solar modules integrating small area sub-cells have been fabricated. This arrangement avoids long distance charge transport in the conductive substrates, which contributes to minimize the efficiency value drop observed for PSCs with an active area higher than 1 cm2. This efficiency drop has been also attributed to an inadequate quality control of large-area perovskite films and to an insufficient optimization of solar module design. ([Yang et al. 2017](#_ENREF_4)) Besides efficiency, stability of PSC devices constitutes one of the major issues hampering PSCs commercialization. ([Hu et al. 2019](#_ENREF_1))

Within this work mini-modules with an active area of 26.4 cm2 were produced according to described elsewhere. ([Saliba et al. 2016](#_ENREF_3)) Mini-modules assembling started with an optimization of the fabrication process of single perovskite solar cell with an active area of 5 cm2. After optimization of the PSC layers deposition, mini-modules with an active area of 10 cm2 (2 sub-cells) were produced, followed by mini-modules with an active area of 15 cm2 (3 sub-cells). Next, a module design optimization was pursued to increase even more the active area of the module without compromising the global efficiency. Perovskite solar mini-modules with an average PCE of 7.4 % were obtained for an active area of 26.4 cm2. Devices were then encapsulated using double side Kapton® tape and the cell edges coated with high temperature epoxy resin (JB Weld®). Stability of encapsulated mini-modules was assessed in the dark during 1000 h under ambient temperature and at 60 °C, according to standard IEC-61646. The impact of the atmospheric conditions during the encapsulation process was also studied. For this, mini-modules were encapsulated under an air ambient atmosphere and a nitrogen atmosphere, and their thermal aging was assessed at 60 ºC under continuous illumination.