HORIZON-CL5-2023-D3-02-12
Large area perovskite solar cells and modules

LUMINOSITY

Large area uniform industry compatible perovskite solar cell technology

Starting date of the project: 01/06/2024
Duration: 48 months

= Deliverable D5.2 =

Laser Patterning

Abstract

Deliverable D5.2 presents the development and optimisation of an industrially compatible laser-patterning process for perovskite solar modules. The work addresses the P1, P2 and P3 scribing steps required to define, isolate and interconnect individual cells while minimising the loss of active module area.

Laser parameters were systematically optimised for perovskite stacks on Al/barrier and PET/ITO substrates. The demonstrated process achieved a geometrical fill factor of 98.9%, exceeding the deliverable target of 98%. Morphological and elemental analyses confirmed successful material removal at the different scribing levels.

The spacing between the laser lines was further refined to balance a high geometrical fill factor with the risk of overlap. A spacing of 30 µm provided a suitable compromise, corresponding to a calculated geometrical fill factor of 98.79%. Fiducial-marker alignment was also demonstrated on PET/ITO substrates, supporting accurate patterning when the substrate is flipped during processing.

Overall, the results demonstrate that the targeted laser-patterning performance was achieved and establish optimised process parameters for the continued development of scalable perovskite solar modules.

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