VIPERLAB

FULLY CONNECTED **VI**RTUAL AND PHYSICAL
PEROVSKITE PHOTOVOLTAICS **LAB**

Towards a Strategic Research and Innovation agenda for Perovskite single-junction PV

Viperlab Frist Public Event, Brussels, May 11 2023

Prof. Dr. Ivan Gordon

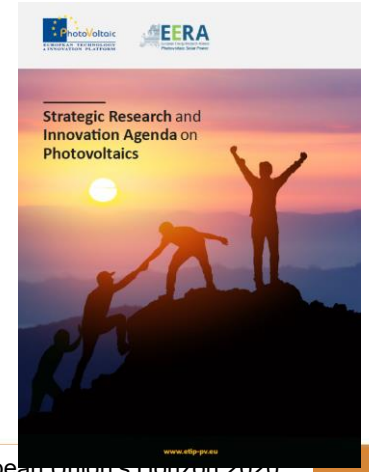
A Strategic Research and Innovation Agenda for perovskite photovoltaics

- One of the goals of the H2020 project Viperlab is to reinforce the European perovskite PV R&D community.

- Focus is on single-junction perovskite PV modules

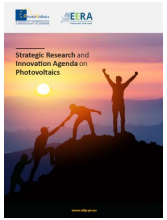
- Starting point is the European Strategic Research and Innovation Agenda for PV drafted in 2022 by ETIP-PV and EERA-PV, covering all PV technologies and applications, including perovskite PV

- Importance of such a SRIA:
  - To guide PV R&D in Europe and have alignment on goals and priorities
  - To guide European and national funding bodies to fund the right topics
  - To make the general public aware about the challenges and opportunities of PV



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°101006715

Refinement of the Viperlab SRIA for perovskite single-junction PV



- Starting point was the European Strategic Research and Innovation Agenda for PV

- Two workshops were organized:
  - September 2022 in Milano, Italy as side event of EU-PVSEC
  - March 2023 in Karlsruhe, Germany as part of the KIT Energy Conversion & Storage days

- Questions that were addressed:
  - Do we agree with the vision and KPIs defined in the EU-SRIA?
  - Do we agree with the activities mentioned in the EU-SRIA?
  - Are there research activities missing in the EU-SRIA?
  - What should be the main priorities and the timeline for the coming years?

- This led then to the Viperlab SRIA for perovskite single-junction PV that is being finalized

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We fine-tuned the targeted KPIs of the SRIA for single-junction perovskite PV

- Original KPIs for 2030 in the perovskite chapter of the EU-SRIA by ETIP-PV / EERA-PV:

KPI	Target Value 2030
LCOE (original)	LCOE of Pk-PV technology should be equal to or lower than that for c-Si
CO2 footprint (original)	The yield specific CO2 footprint of Pk-PV should be <80% of c-Si production and Pk-PV modules should be fully recyclable
Manufacturing (original)	Commercially available, Pk-based modules with an efficiency of > 23%

- Outcome of the Viperlab workshops:
  - More emphasis needed on commercially available perovskite modules that have been produced in Europe and that are in line with the EU safety requirements (e.g. in terms of Pb content).
  - The CO_2-footprint KPI was considered as one of the main differentiators compared to traditional Si-PV
  - The LCoE target was found to be unrealistic, since to this would require large-scale production of perovskite PV modules by 2030 at a similar scale as Si-PV production which is unlikely.

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Outcome of the first SRIA workshop on single-junction perovskite PV

- Modified KPIs for the SRIA for 2030:

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Outcome of the first SRIA workshop on single-junction perovskite PV

- Modified KPIs for the SRIA for 2030:

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LCOE (original)	LCOE of Pk-PV technology should be equal to or lower than that for c-Si
Efficiency (new)	Large-scale (> 1 m2) single-junction Pk-PV module demonstrators should be available with energy conversion efficiency above 23%

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CO2 footprint (remained)	The yield specific CO2 footprint of Pk-PV should be <80% of c-Si production and Pk-PV modules should be fully recyclable
Manufacturing (original)	Commercially available, Pk-based modules with an efficiency of > 23%
Manufacturing (modified)	Pk-based modules fully processed in Europe are commercially available and should comply with all European safety and toxicity rules across their whole life cycle

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Summary

- The Viperlab project is preparing a Strategic Research and Innovation Agenda for single-junction perovskite photovoltaics

- Via two workshops the chapter on perovskite PV of the EU-SRIA by ETIP-PV and EERA-PV has been refined:
  - Updated KPI's by 2030
  - Prioritization of activities needed
  - Drafting of a clear timeline and roadmap to obtain the KPI's

- The Viperlab SRIA for perovskite single-junction PV will be finalized in the coming months

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