



VIPERLAB workshop  
8<sup>th</sup> Feb 2022 ONLINE

## *The Perovskite Database: The United Output of the Perovskite PV community*



Dr. Jesper  
Jacobsson

Jesper Jacobsson<sup>1,4</sup>, Eva L. Unger<sup>1,2,3</sup> + 92 co-authors!

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# Initiated as part of the EU-funded project GRECO

Release article:

Jacobsson et al., Nature Energy 2021  
(DOI: 10.1038/s41560-021-00941-3)

Project webpage: [www.perovskitedatabase.com](http://www.perovskitedatabase.com)

**nature energy** RESOURCE  
<https://doi.org/10.1038/s41560-021-00941-3>

**OPEN**  
**An open-access database and analysis tool for perovskite solar cells based on the FAIR data principles**

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## The Perovskite Database Project

- Introduction
- Interactive graphics
- Resources
- Download data
- Upload data
- Contributors
- Papers based on the project
- Presentations
- Partners
- How to cite/License

### Introduction

The Perovskite Database Project aims at making all perovskite device data, both past and future, available in a form adherent to the FAIR data principles, i.e. findable, accessible, interoperable, and reusable.

In the initial phase of the project, the project team went through the over 16000 perovskite papers published until the end of February 2020 and extracted data for every single adequately described perovskite solar cell we could find. For papers published after that, the database relies on authors to upload their own data.

The project is based around an open database and open-sourced tools enabling anyone, without any programming experience, to interactively explore, search, filter, analyse, and visualise the data. The core of those tools are a set of interactive graphics that can be reached from the web page.

### Examples from the database

Development of device performance

All devices



GRECO *"bringing open science into action"*

“Open Research Europe **requires open access to research data** supporting articles under the principle ‘as open as possible, as closed as necessary’, according to the policy of Horizon 2020. **Data should be deposited in data repositories.**”

from: <https://open-research-europe.ec.europa.eu/for-authors/data-guidelines>



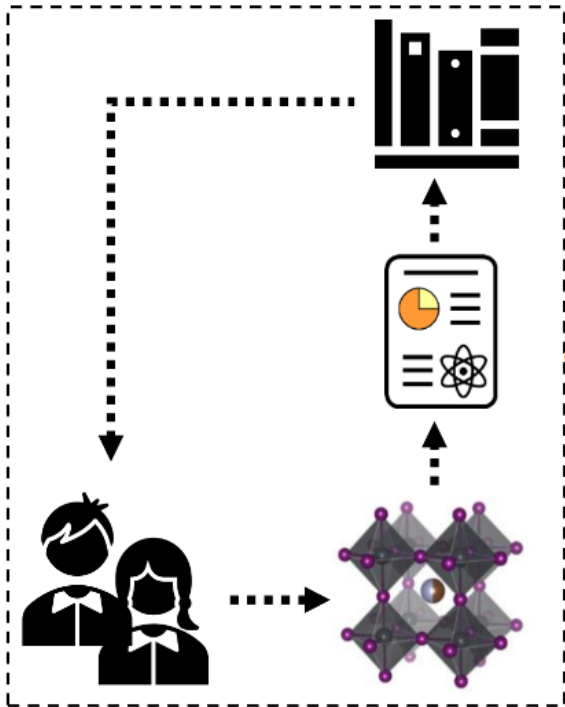
What are suitable repositories? – existing ones mostly “generic”

What would be data platforms that are actually useful for us scientist that Truly make our results more FAIR (findable, accessible, interoperable & reusable)?



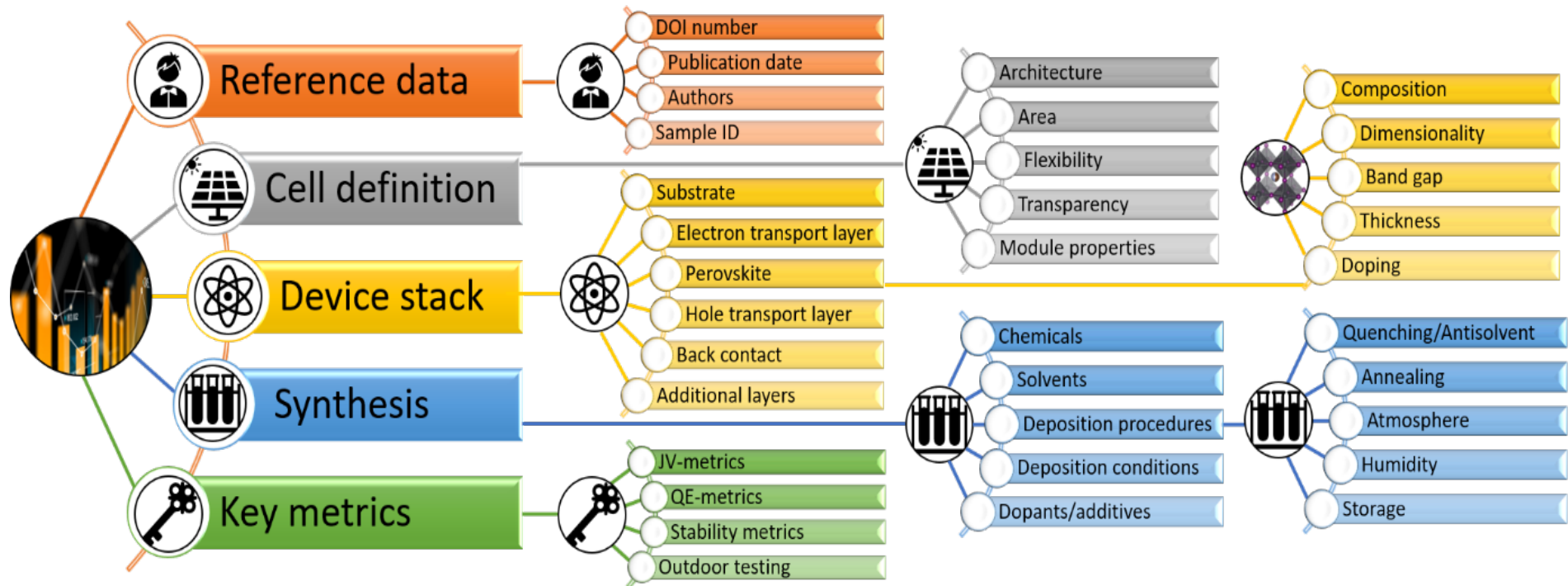
# The motivation: Breaking the "standard research cycle"

Standard research cycle



# Step 1: Defining the "data ontology" (first draft)

Focussed on meta-data related to device stack definition & solar cell performance

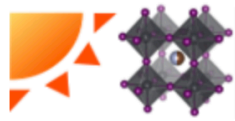


There is a need to develop coherent data ontologies to specify metadata of device manufacturing steps.



Major goal of VIPERLAB:  
Develop a unified data ontology for perovskite PV devices.  
(there will be a workshop...)

# Data extraction protocol (current version available online)



The Perovskite database

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### More data makes the database more useful

The database was initiated by collecting all perovskite devices from the community should embrace this as a valuable resource. The database can think of as the Wikipedia of perovskite science.

We thus encourage anyone to upload new device data, whether a highly efficient or a failed device, but some data

### Data extraction protocol

To upload new data to the database, the data must be formatted according to the backend for inserting data to the database consists of specific formatting guidelines. The latest version of the data extraction template are found in the template. The instructions

[Download data extraction template](#)

[Download data extraction instructions](#)

Current version:  
395 attributes/fields  
per devices (and growing)

A	B
1 Ref. ID temp (Integer starting from 1 and counting upwards)	1
2 Ref. Name of person entering the data	T. Jesper Jacobsson
3 Ref. Data entered by author [TRUE/FALSE]	TRUE
4 Ref. DOI number	10.1039/C6EE00030D
5 Ref. Lead author	Jacobsson et al.
6 Ref. Publication date [year:mm:dd]	2018:03:14
7 Ref. Free text comment (max 280 characters)	Simple example device (to be deleted)
8 Ref. Internal sample ID [free text]	JJ 3051 cell 2
9 Cell. Stack sequence [Mat.1; Mat.2; ...   Mat.3; ...   Mat.4   ...]	SLG   FTO   TiO2-c   TiO2-mp   Perovskite   Spiro-MeOTAD   Au
10 Cell. Area. Total [cm^2]	0,25
11 Cell. Area. Measured [cm^2]	0,16
12 Cell. Number of cells per substrate	3
13 Cell. Architecture [nip/pin/ ...]	nip
14 Cell. Flexible [TRUE/FALSE]	FALSE
15 Cell. Flexible. Minimum bending radius [cm]	
16 Cell. Semitransparent [TRUE/FALSE]	FALSE
17 Cell. Semitransparent. Average visible transmittance [%]	
18 Cell. Semitransparent. Average visible transmittance. Wavelength range [lambda_min; lambda_max]	
19 Cell. Semitransparent. Transmittance. Link. Raw data	www.testsite...
20 Module [TRUE/FALSE]	FALSE
21 Module. Number of cells in module	0
22 Module. Area. Total [cm^2]	0,25
23 Module. Area. Effective [cm^2]	0,16
24 Module. JV data recalculated per cell [TRUE/FALSE]	FALSE
25 Substrate. Stack sequence [Mat.1; Mat.2; ...   Mat.3; ...   Mat.4   ...]	SLG   FTO
26 Substrate. Thickness [Th.1   Th.2   ...   Th.n ] [mm]	2   0.1
27 Substrate. Area [cm^2]	2,4
28 Substrate. Supplier	NGO
29 Substrate. Brand name	NGO11
30 Substrate. Deposition procedure [Proc. 1 >> Proc. 2 >> ...   Proc. 3 >> ...]	Commercial   Commercial
31 Substrate. Surface roughness. Rms [nm]	
32 Substrate. Etching procedure	Zn-powder; HCl >> Mechanical scrubbing
33 Substrate. Cleaning procedure	Helmanex >> Ultrasonic bath >> Ethanol; Ultrasonic bath >> Acetone; Ultrasonic
34 ETL Stack sequence [Mat.1; Mat.2; ...   Mat.3; ...   Mat.4   ...]	TiO2-c   TiO2-mp
35 ETL Thickness [Th.1   Th.2   ...   Th.n ] [nm]	50   150
36 ETL Additives. Compounds [Addt.1; Addt.2; ...   Addt.3; ...   Addt.4   ...]	Undoped   Li-TFSI
37 ETL Additives. Concentrations [c1 M; c2 wt%; ...   c3 vol%; ...   c4 mg/ml nan   100 mg/ml]	
38 ETL Deposition. Procedure [Proc. 1 >> Proc. 2 >> ...   Proc. 3 >> ...   Proc. Spray-pyrolysis   Spin-coating >> Spin-coating]	
39 ETL Deposition. Aggregation state of reactants (Liquid/Gas/Solid) [Agr. 1   Liquid   Liquid]	
40 ETL Deposition. Synthesis atmosphere [Gas1; Gas2 >> Gas3; ... >> ...   G. Air; O2   Air]	
41 ETL Deposition. Synthesis atmosphere. Pressure. Total [P.1 >> P.2 >> ...   1 atm   1 atm]	
42 ETL Deposition. Synthesis atmosphere. Pressure. Partial [P.1; P.2 >> P.3   1 atm; 1 bar   1 atm]	
43 ETL Deposition. Synthesis atmosphere. Relative humidity [RH1 >> RH2 >> 35   35]	
44 ETL Deposition. Solvents [Sol.1; Sol.2 >> Sol.3; ... >> ...   Sol.4 >> ...   Sol. Acetonitril; Acetyl acetone; IPA   Ethanol >> Acetonitrile]	
45 ETL Deposition. Solvents. Mixing ratios [V1; V2 >> V3; V4 >> ...   V5; V6 >> 9:0.4:0.6   1 >> 1]	
46 ETL Deposition. Solvents. Supplier [Sup.1; Sup.2 >> Sup.3; ... >> ...   Sup. Sigma Aldrich; Sigma Aldrich; Fisher   Sigma Aldrich >> Acros]	
47 ETL Deposition. Reaction solutions. Compounds [C1; C2 >> C3; ... >> ...   Pur.4 >> Pro analysis; Pro analysis; Pro analysis   Puris >> Pro analysis]	
48 ETL Deposition. Reaction solutions. Compounds. Supplier [Sup.1; Sup.2 >> Sigma Aldrich   Dysole >> Sigma Aldrich]	
49 ETL Deposition. Reaction solutions. Compounds. Purity [Pur.1; Pur.2 >> P. Pro analysis   Tecnical >> Pro analysis]	
50 ETL Deposition. Reaction solutions. Concentrations [c1 M; c2 mol/dm3 >> 6 vol%   150 mg/ml >> 10 mg/ml]	
51 ETL Deposition. Reaction solutions. Volumes [V1 >> V2 >> ...   V3 >> ...   10   0.05 >> 0.05]	
52 ETL Deposition. Reaction solutions. Age [A1 >> A2 >> ...   A3 >> ...   A4 0.5   1000 >> 1000]	

# More "comfortable" data entry



## "GUI or electronic lab notebook"

- Introduction
- Interactive graphics
- Resources
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- Upload data**
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**Bibliographic** | Device | Compounds | **Cell** | Module | Analysis | KPIs

### Device layout

Substrate area   (unit)

# of pixels

Test cell area   (unit)

### Schematic Device Layout

### Further Information

Free text

### Device Layer stack

pin

nip

#### Schematic

- Substrate
- HTM
- Perovskite
- ETL
- Back contact
- ⊕ Add layer**

### Single Layer Definition: Perovskite Absorber

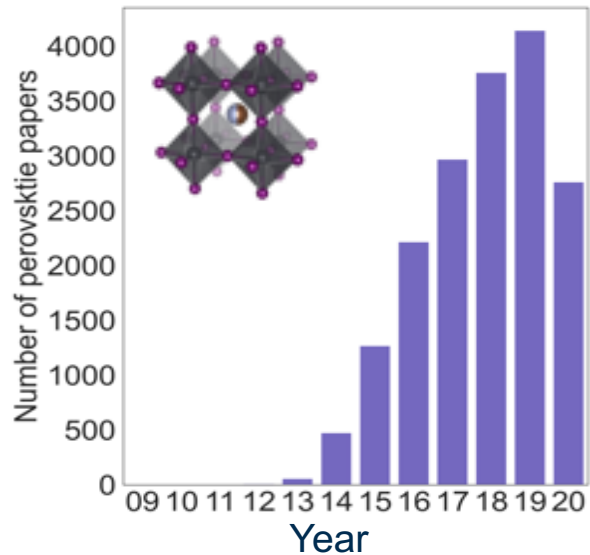
Solution processed

Vapor deposition

Precursor Ink	Dep. Method	Analysis	KPIs
Precursor(s)	<input type="text"/>	<input type="text"/> (unit)	
Additive(s)	<input type="text"/>	<input type="text"/> (unit)	
Solvent(s)	<input type="text"/>	<input type="text"/> (unit)	

[Link to "chemical database"/compounds](#)

## Step 2: Recruiting volunteers to help us



"Perovskite Solar Cells"\*:  
 > 16 000 papers published

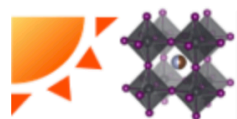
16 000 / 80  
 = 200 papers each

recruited 80 volunteers  
 (from 30 research institutions)



## Step 3: Launch database

[www.perovskitedatabase.com](http://www.perovskitedatabase.com)



The Perovskite  
database

## The Perovskite Database Project

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### Interactive graphics

To facilitate easy exploration of the perovskite data we have developed a set of interactive graphics tools. Those enable simple interactive exploration of the data in the database. The interactive graphics are hosted by Materials Zone. To reach the graphics you will need to create a free account. To access the interactive graphics, you will need to fill out [this form](#). Shortly after filling out the form, you will receive an invitation by email.

Figures generated by the interactive graphics are free to be used in any way.

[Fill out the form to access the interactive graphics](#)

### There are now 9 apps focusing on different aspects, with more to come.

Figures generated by the interactive graphics are free to be used in any way.

The apps are found under “Insights >> Perovskite Database Project” in the left side menu in Materials Zone’s system found on the link below (see instructions above on how to obtain access to the interactive graphics)

[Link to interactive graphics](#)

### General development

Focuses on the development of general device performance and enables filtering within the entire dataset

# Example: Evolution of reported PCEs as function of publication date

You can download generated plots as figures and re-use.

MaterialsZone CREATE ?

Insights ^

Data Overview ^

Perovskite Database Tandem Project ^

Perovskite Database Project ^

Bandgap Analysis

Correct Data In The Database

Download Data

General Development

Modules

Outdoor Testing

Record Evolution

Scaling

Stability

Upload Data

Items ^

### General Development

Scatterplot | Categorical plots | Data from plot in table | Selected data from plot in table | About

#### Figure properties

Y-Axis: PCE [%]

X-Axis: Publication date

Y-Axis scale: Linear

X-Axis scale: Linear

Color by category: none

Color by True/False filters: none

Exclude Cell ID (ID1; ID2; ID3; ...)

Marker alpha: 0.60

Marker size: 8

X-axis. log scale lower limit: -1

Y-axis. log scale lower limit: -1

Font size: 20

Legend font size: 10

Data when hover over a point

- Cell aria
- Cell stack
- ETL
- HTL
- FF
- Jsc

Download figure metadata

#### Measurement properties

Publication date: 14 Mar 2009 .. 20 Jun 2021

Light intensity [mW/cm<sup>2</sup>]: 90 .. 110

#### Sample properties

Number of cells in module: 1 .. 35

Total Module area [cm<sup>2</sup>]: 0 .. 500

Active Module area [cm<sup>2</sup>]: 0 .. 150

Active cell area [cm<sup>2</sup>]: 0 .. 100

Band gap [eV]: 1 .. 3.50

Encapsulated cell

Flexible cell

Transparent cell

Modules

Perovskite. 0D (QDs)

Perovskite. 2D

Perovskite. 2D/3D mixture

Perovskite. 3D

Perovskite. 3D with 2D capping layer

Perovskite. Single crystal

Inorganic perovskite

Lead free perovskite

Perovskite crystal structure

Perovskite inspired structure

Antisolvent method

Solvent annealing of the Perovskite

Cell\_architecture

- All
- Back contacted
- Front contacted
- Pn-Heterojunction
- Schottky
- Unknown

#### Most common alternatives

Perovskite

- All
- (5-AVA)MAPbI
- (PEA)MAPbI
- AgBiI
- AgCsBiBr
- BAMAPbI
- CsFAMAPbBrI
- CsFAMAPbI
- CsFAPbBrI
- CsFAPbI
- CsFAPbSnI
- CsMAPbI
- CsPbBr
- CsPbBrI
- CsPbI
- CsSnI
- FAMAPbBrI
- FAMAPbI
- FAMAPbSnI
- FAMASnI

ETL stack

- All
- C60
- C60 | BCP
- PCBM-60
- PCBM-60 | BCP
- PCBM-60 | Bphen
- PCBM-60 | C60
- PCBM-60 | C60 | BCP
- PCBM-60 | LiF
- PCBM-60 | PEI
- PCBM-60 | ZnO-np
- PCBM-60 | Zr(acac)<sub>4</sub>
- PCBM-60 | bis-C60
- PCBM-70
- SnO<sub>2</sub>-c
- SnO<sub>2</sub>-c | C60-SAM
- SnO<sub>2</sub>-c | PCBM-60
- SnO<sub>2</sub>-np
- TiO<sub>2</sub>-c
- TiO<sub>2</sub>-c | Al<sub>2</sub>O<sub>3</sub>-mp

HTL stack

- All
- Cu<sub>2</sub>O
- CuI
- CuPc
- CuSCN
- Graphene oxide
- MoO<sub>3</sub> | PEDOT:PSS
- NiMgLiO
- NiMgLiO-c
- NiO
- NiO-c
- NiO-c | NiO-mp

The Perovskite Database Project, 2021-11-23

Screenshot of identified JV data

# The Perovskite Database: A secondary dissemination platform

[www.perovskitedatabase.com](http://www.perovskitedatabase.com): You can download the data and replot however you like to re-use.

MaterialsZone

General Development

Scatterplot | Categorical plots | Data from plot in table | ...

Figure properties

- Y-Axis: PCE [%]
- X-Axis: Publication date
- Y-Axis scale: Linear
- X-Axis scale: Linear
- Color by category: none
- Color by True/False filters: none
- Exclude Cell ID (ID1; ID2; ID3; ...):
- Marker alpha: 0.60
- Marker size: 8
- X-axis. log scale lower limit: -1
- Y-axis. log scale lower limit: -1
- Font size: 20
- Legend font size: 10
- Data when hover over a point: Cell aria, Cell stack, ETL, HTL, FF, Jsc

Sample properties

- Number of cells in module: 1 .. 35
- Total Module area [cm<sup>2</sup>]: 0 .. 500
- Active Module area [cm<sup>2</sup>]: 0 .. 150

Most common alternatives

Perovskite

- All
- (5-AVA)MAPbI
- (PEA)MAPbI
- AgBiI
- AgCsBiBr
- BAMAPbI
- CsFAMAPbBrI
- CsFAMAPbI
- CsFAPbBrI
- CsFAPbI
- CsFAPbSnI
- CsMAPbI
- CsPbBr
- CsPbBrI
- CsPbI
- CsSnI
- FAMAPbBrI
- FAMAPbI
- FAMAPbSnI
- FAMASnI

ETL stack

- All
- C60
- C60 | BCP
- PCBM-60
- PCBM-60 | BCP
- PCBM-60 | Bphen
- PCBM-60 | C60
- PCBM-60 | C60 | BCP
- PCBM-60 | LiF
- PCBM-60 | PEI
- PCBM-60 | ZnO-np
- PCBM-60 | Zr(acac)<sub>4</sub>
- PCBM-60 | bis-C60
- PCBM-70
- SnO<sub>2</sub>-c
- SnO<sub>2</sub>-c | C60-SAM
- SnO<sub>2</sub>-c | PCBM-60
- SnO<sub>2</sub>-np
- TiO<sub>2</sub>-c
- TiO<sub>2</sub>-c | Al<sub>2</sub>O<sub>3</sub>-mp

HTL stack

- All
- Cu<sub>2</sub>O
- CuI
- CuPc
- CuSCN
- Graphene oxide
- MoO<sub>3</sub> | PEDOT:PSS
- NiMgLiO
- NiMgLiO-c
- NiO
- NiO-c
- NiO-c | NiO-mp

Cell\_architecture

- All
- Back contacted
- Front contacted
- Pn-Heterojunction
- Schottky
- Unknown

(A) All devices

Jacobsson et al., Nat. En. 2021  
DOI: 10.1038/s41560-021-00941-3

PCE [%]

Publication date

Devices

Counts

Screenshot

# Example: Evolution of reported PCEs as function of publication date

You can emphasize datapoints in the dataplots (example: certified data)

MaterialsZone CREATE ?

**General Development**

Scatterplot | Categorical plots | Data from plot in table | Selected data from plot in table | ABOUT

**Figure properties**

Y-Axis: PCE [%]  
X-Axis: Publication date  
Y-Axis scale: Linear  
X-Axis scale: Linear  
Color by category: none  
**Color by True/False filters**  
Externally certified JV data  
Separate color by marker type  
Exclude Cell ID (ID1; ID2; ID3; ...)  
Marker alpha: 0.60  
Marker size: 8  
X-axis. log scale lower limit: -1  
Y-axis. log scale lower limit: -1  
Font size: 20  
Legend font size: 10  
Data when hover over a point: Cell area, Cell stack, ETL, HTL, FF, Jsc  
Download figure metadata

**Measurement properties**

Publication date: 14 Mar 2009 .. 20 Jun 2021  
Light intensity [mW/cm<sup>2</sup>]: 90 .. 110  
Externally certified JV data

**Sample properties**

Number of cells in module: 1 .. 35  
Total Module area [cm<sup>2</sup>]: 0 .. 500  
Active Module area [cm<sup>2</sup>]: 0 .. 150  
Active cell area [cm<sup>2</sup>]: 0 .. 100  
Band gap [eV]: 1 .. 3.50  
Encapsulated cell  
Flexible cell  
Transparent cell  
Modules  
Perovskite. 0D (QDs)  
Perovskite. 2D  
Perovskite. 2D/3D mixture  
Perovskite. 3D  
Perovskite. 3D with 2D capping layer  
Perovskite. Single crystal  
Inorganic perovskite  
Lead free perovskite  
Perovskite crystal structure  
Perovskite inspired structure  
Antisolvent method  
Solvent annealing of the Perovskite  
Cell\_architecture: All, Back contacted, Front contacted, Pn-Heterojunction, Schottky, Unknown

**Most common alternative**

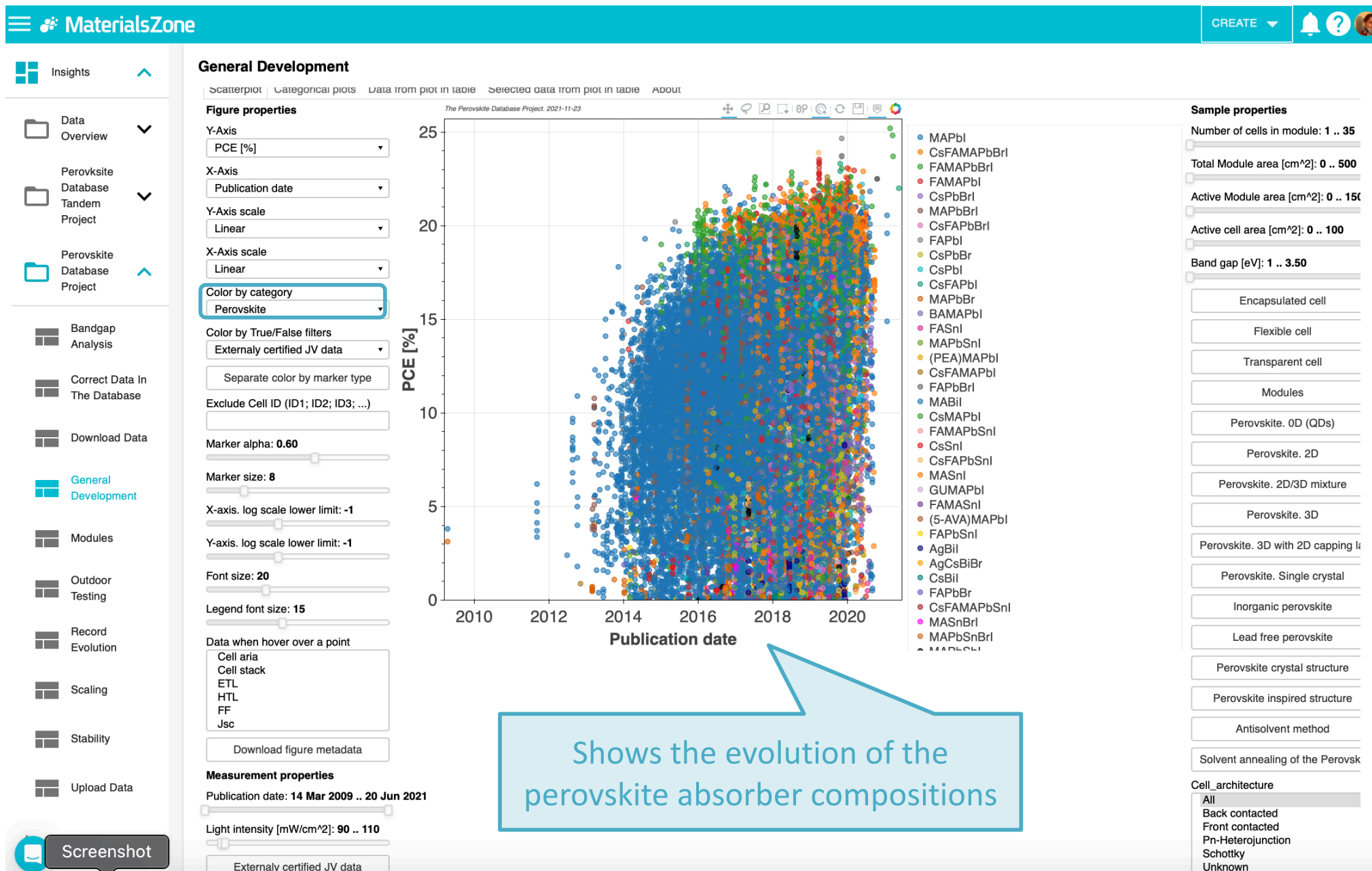
**Perovskite**  
All  
(5-AVA)MAPbI  
(PEA)MAPbI  
AgBiI  
AgCsBiBr  
BAMAPbI  
CsFAMAPbBrI  
CsFAMAPbI  
CsFAPbBrI  
CsFAPbI  
CsFAPbSnI  
CsMAPbI  
CsPbBr  
CsPbBrI  
CsPbI  
CsSnI  
FAMAPbBrI  
FAMAPbI  
FAMAPbSnI  
FAMASnI

**ETL stack**  
All  
C60  
C60 | BCP  
PCBM-60  
PCBM-60 | BCP  
PCBM-60 | Bphen  
PCBM-60 | C60  
PCBM-60 | C60 | BCP  
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PCBM-60 | ZnO-np  
PCBM-60 | Zr(acac)<sub>4</sub>  
PCBM-60 | bis-C60  
PCBM-70  
SnO<sub>2</sub>-c  
SnO<sub>2</sub>-c | C60-SAM  
SnO<sub>2</sub>-c | PCBM-60  
SnO<sub>2</sub>-np  
TiO<sub>2</sub>-c  
TiO<sub>2</sub>-c | Al<sub>2</sub>O<sub>3</sub>-mp

**HTL stack**  
All  
Cu<sub>2</sub>O  
CuI  
CuPc  
CuSCN  
Graphene oxide  
MoO<sub>3</sub> | PEDOT:PSS  
NiMgLiO  
NiMgLiO-c  
NiO  
NiO-c  
NiO-c | NiO-mp

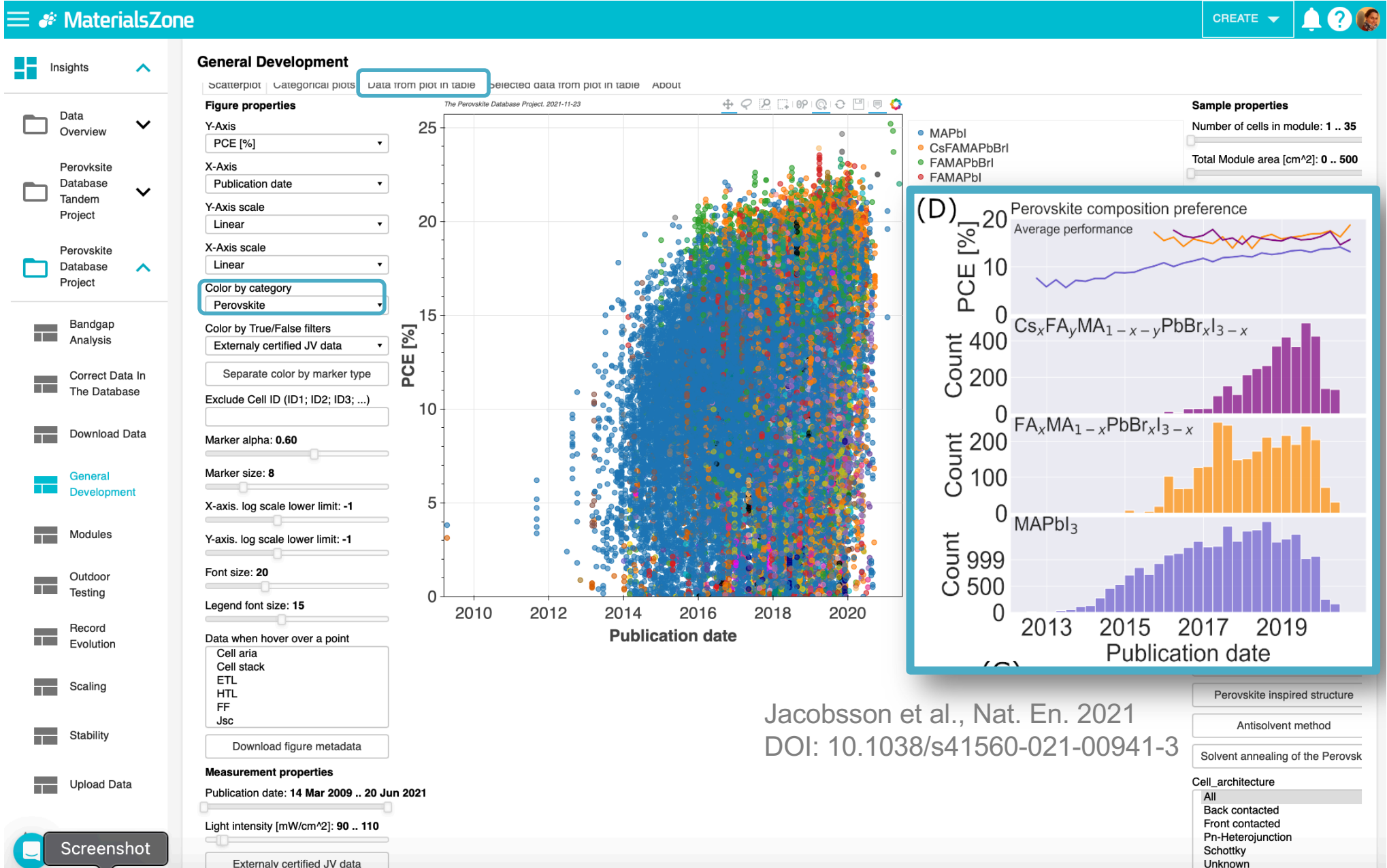
# Example: Evolution of reported PCEs as function of publication date

You can highlight different data categories to view trends (example: perovskite composition)



# Example: Evolution of reported PCEs as function of publication date

Pick data-sets you find most interesting (example: evolution of perovskite compositions)



# Outlook...

You note that collected data thins-out after 2020...

MaterialsZone

CREATE



Insights

- Data Overview
- Perovskite Database Tandem Project
- Perovskite Database Project

Bandgap Analysis

Correct Data In The Database

Download Data

General Development

Modules

Outdoor Testing

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## General Development

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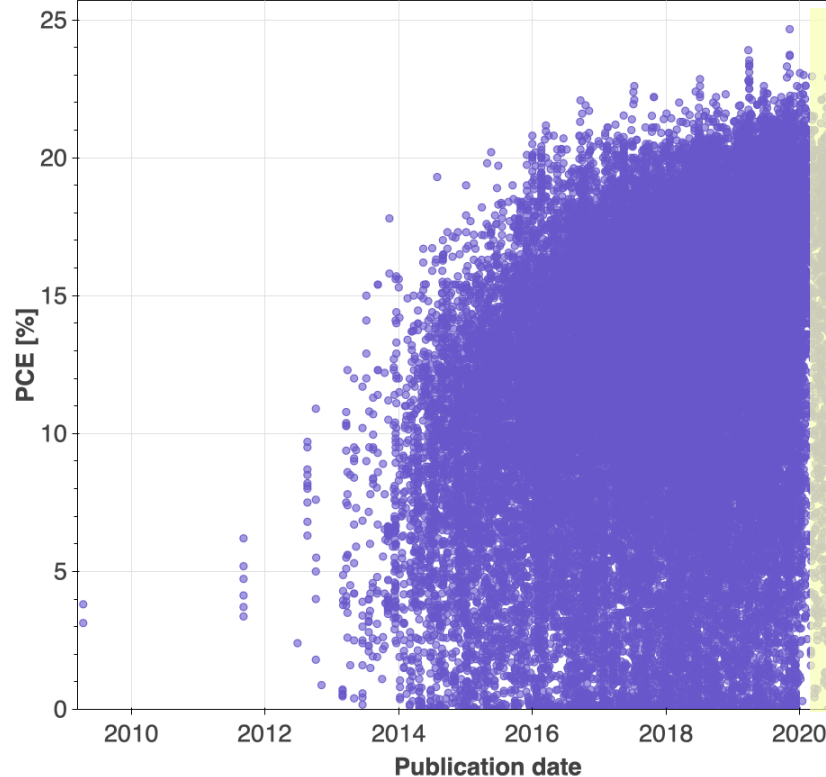
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The Perovskite Database Project, 2021-11-23



### Sample properties

Number of cells in module: 1 .. 35

Total Module area [cm<sup>2</sup>]: 0 .. 500

Active Module area [cm<sup>2</sup>]: 0 .. 150

Active cell area [cm<sup>2</sup>]: 0 .. 100

Band gap [eV]: 1 .. 3.50

Encapsulated cell

Flexible cell

Transparent cell

Modules

Perovskite. 0D (QDs)

Perovskite. 2D

Perovskite. 2D/3D mixture

Perovskite. 3D

Perovskite. 3D with 2D capping layer

Perovskite. Single crystal

Inorganic perovskite

Lead free perovskite

Perovskite crystal structure

Perovskite inspired structure

Antisolvent method

Solvent annealing of the Perovskite

### Most common alternatives

- Perovskite
- All
  - (5-AVA)MAPbI
  - (PEA)MAPbI
  - AgBiI
  - AgCsBiBr
  - BAMAPbI
  - CsFAMAPbBrI
  - CsFAMAPbI
  - CsFAPbBrI
  - CsFAPbI
  - CsFAPbSnI
  - CsMAPbI
  - CsPbBr
  - CsPbBrI
  - CsPbI
  - CsSnI
  - FAMAPbBrI
  - FAMAPbI
  - FAMAPbSnI
  - FAMASnI
- ETL stack
- All
  - C60
  - C60 | BCP
  - PCBM-60
  - PCBM-60 | BCP
  - PCBM-60 | Bphen
  - PCBM-60 | C60
  - PCBM-60 | C60 | BCP
  - PCBM-60 | LiF
  - PCBM-60 | PEI
  - PCBM-60 | ZnO-np
  - PCBM-60 | Zr(acac)<sub>4</sub>
  - PCBM-60 | bis-C60
  - PCBM-70
  - SnO<sub>2</sub>-c
  - SnO<sub>2</sub>-c | C60-SAM
  - SnO<sub>2</sub>-c | PCBM-60
  - SnO<sub>2</sub>-np
  - TiO<sub>2</sub>-c
  - TiO<sub>2</sub>-c | Al<sub>2</sub>O<sub>3</sub>-mp
- HTL stack
- All
  - Cu<sub>2</sub>O
  - CuI
  - CuPc
  - CuSCN
  - Graphene oxide
  - MoO<sub>3</sub> | PEDOT:PSS
  - NiMgLiO
  - NiMgLiO-c
  - NiO
  - NiO-c
  - NiO-c | NiO-mp

Please all join! Just sign up!

[www.perovskitedatabase.com](http://www.perovskitedatabase.com)

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[eva.unger@helmholtz-berlin.de](mailto:eva.unger@helmholtz-berlin.de)

Screenshot

## Strategies to keep feeding the database

Join: sign up via [www.perovskitedatabase.com](http://www.perovskitedatabase.com)

Use the data available for anything you want

You can download plots as well as the complete dataset: use it!

Make YOUR research data easier to find

Upload all your experimental perovskite PV datasets to The Perovskite Database upon publication and link to DOI of your article (fulfills "OpenScience" requirements!)

Upload other's work & spread the word

Invite and make others aware of the project

Check data that is online for inconsistencies

Remove/correct with correct data function

Become involved feeding the database

We hope this to become a community-driven project



If you want to start a specific expansion of the database, please submit proposal via VIPERLAB.



# Remaining OPEN: Initiation of collaborative review papers

List of ongoing collaborative research papers available on [www.perovskitedatabase.com](http://www.perovskitedatabase.com)

**My Drafts** 4

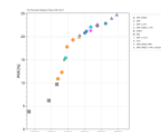
Public Documents 0



June 01, 2021

## Insights from the Perovskite Database Project: Ink formulation evolution

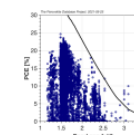
eva.unger, oleksandra.shargaieva, jinzhao.li, et al.



May 25, 2021

## "Collective Insight from the Perovskite Database Project": Bandgap Tuning of Metal-Ha...

eva.unger, oleksandra.shargaieva, klara.suchan, et al.



June 01, 2021

## Insights from the Perovskite Database Project: Scalable Manufacturing Methods

eva.unger, gopinath.paramasivam, jinzhao.li, et al.



You have an idea for a review paper based on the data available?  
Write short proposal to be submitted via VIPERLAB Gate  
(or write me a brief e-mail: [eva.unger@helmholtz-berlin.de](mailto:eva.unger@helmholtz-berlin.de))

# The Perovskite Database Expansion in VIPERLAB

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home > infrastructure > hzb-hysprint – perovskite database

### HZB-HYSPRINT – PEROVSKITE DATABASE

Access to *The Perovskite Database* is available to anyone!

HZB

DESCRIPTION

INFO

EXPERTISE

To access:

[MORE INFO](#)

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A MySQL-based database promoting OpenScience practices in the perovskite PV research community



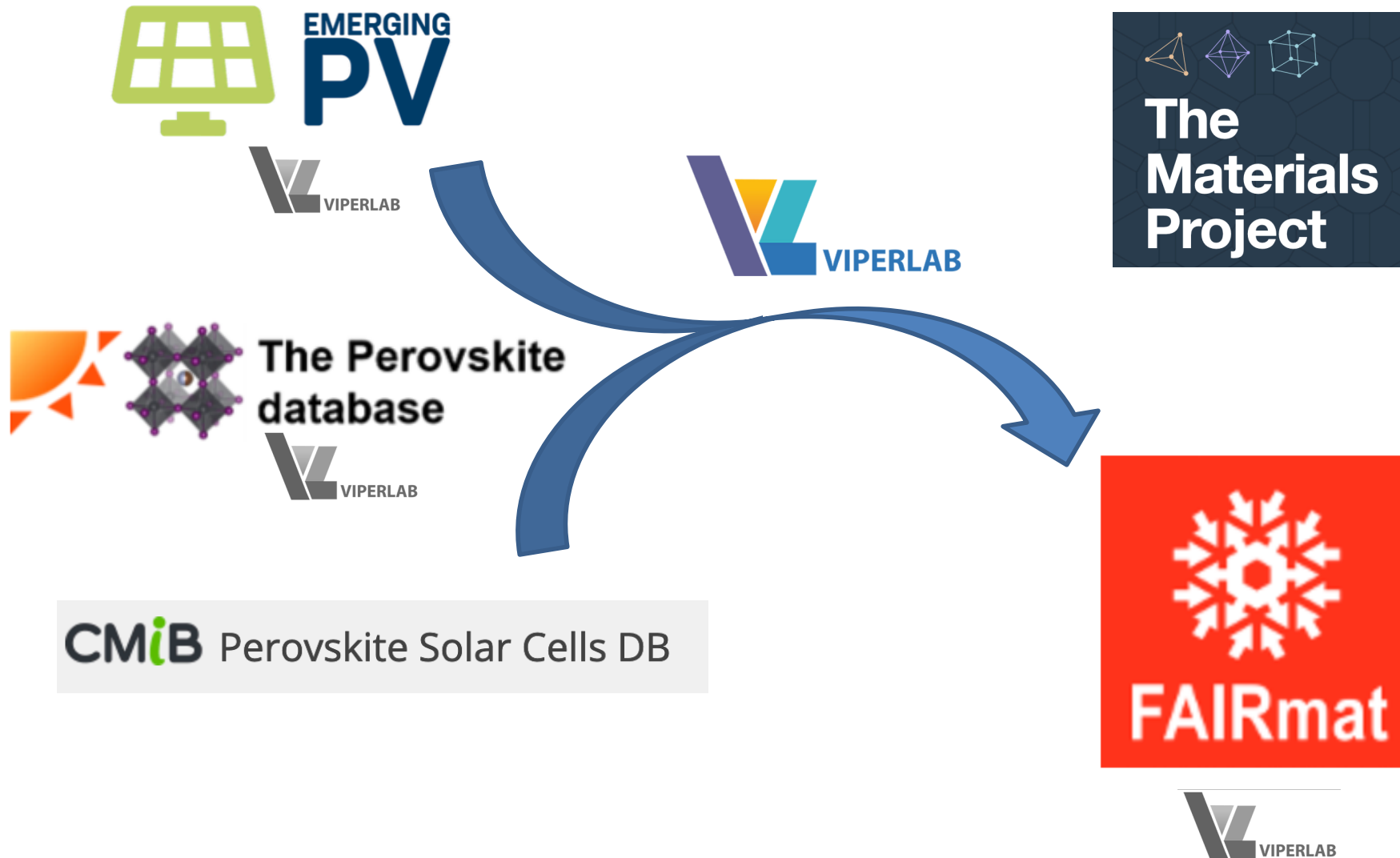
Enabling literature research and dissemination/sharing of scientific data according to FAIR data principles



For using the database in review papers, we kindly ask you to register your project on [www.perovskitedatabase.com](http://www.perovskitedatabase.com)

Anything requiring changing data scope or programming:  
write a proposal!

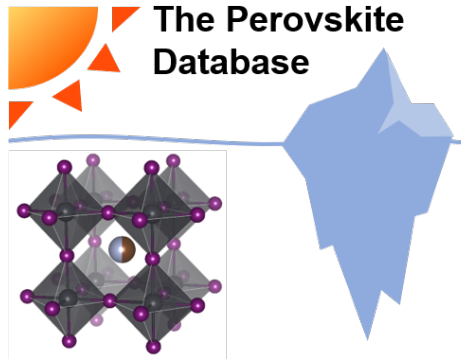
# Related Relevant Data Infrastructures



# Acknowledgement



Dr. Jesper  
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(tenure track  
Professor @ Nankai  
University in China)



Please all join! Just sign up!  
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