FWO - G098319N (Perovskopy)

A Data Management Plan created using DMPonline.be

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Project abstract:

A grand challenge of the 21st century is to meet the ever-increasing global energy demand. With the advent of (i) metal halide perovskite and (ii) metal thin films, (i) solar light can today be transformed into electricity and (ii) electric energy stored into chemicals, yet, with significant energy losses. Therefore, pushing the energy efficiency of these functional energy materials beyond current limits is of ultimate importance.
Today's efforts have however mainly focused on advanced synthesis protocols to design the next-generation of functional energy materials. Here, in contrast, we explore a radically different, nanomechanical approach based on elastic deformation of the metal (halide perovskite) thin films – an approach still in its infancy. In particular, controlled and dynamic expansion of the crystal lattice will be exploited to tailor the bulk and surface properties of metal (halide perovskite) thin films. Our vision is that delivering strain as an active, external 'stimulus' will open an unparalleled way of application-tailored tuning of the performance, not achievable by rational materials design.
This WEAVE project will exploit an interdisciplinary and synergetic methodology by combining and advancing (i) a unique nanomechanical test platform (UCL) from materials engineering to strain (ii) thin film functional energy materials (UGent, KUL), (iii) probed by state-of-the-art optical (KUL), X-ray (UGent) and electron-based (UCL) characterization.

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DPIA

DPIA

Have you performed a DPIA for the personal data processing activities for this project?

- Not applicable

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GDPR

GDPR

Have you registered personal data processing activities for this project?

- Not applicable

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Application DMP

Questionnaire

Describe the datatypes (surveys, sequences, manuscripts, objects …) the research will collect and/or generate and /or (re)use. (use up to 700 characters)

Digital data type will be mostly numerical data. The envisaged data object are spreadsheets, databases, images, maps. The mode of data collection are through experiment and/or simulation.
The collected data will be mainly born-digital, but can also be complemented by non-digital notes.
The partners will produce primary data, generated by the researcher for a particular research purpose or project. The data life cycle will go through the following stages: raw, pre-processed, processing and data output for figures in manuscripts. The collected data will be saved in the most simple, open (i.e. nonproprietary) file format, such as .txt or .csv file formats, most commonly used
by researchers.

Specify in which way the following provisions are in place in order to preserve the data during and at least 5 years after the end of the research? Motivate your answer. (use up to 700 characters)

During the project, a KUL-based sharepoint website will be set-up, backed-up in a digital cloud, to store data relevant for the WEAVE project (responsibility Prof. Roeffaers). This e-platform allows quasi-unlimited data storage, i.e. up to 100 GB/file and a total storage capacity of 10 TB. Data having no relevance for the WEAVE project will be saved on local data storage devices at partner institutes.
Long term preservation of the data after the project (+5 years) will be done by data deposition on public archives, e.g. generic repositories as zenodo.org (EU funded/trusted). We certify the best practices of the FAIR principles will be followed.

What’s the reason why you wish to deviate from the principle of preservation of data and of the minimum preservation term of 5 years? (max. 700 characters)

NA. Data will be stored for the duration of the project +5 years

Are there issues concerning research data indicated in the ethics questionnaire of this application form? Which specific security measures do those data require? (use up to 700 characters)

NA

Which other issues related to the data management are relevant to mention? (use up to 700 characters)

NA. No other issues exist related to data management.

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FWO DMP (Flemish Standard DMP)

1. Research Data Summary

List and describe all datasets or research materials that you plan to generate/collect or reuse during your research project. For each dataset or data type (observational, experimental etc.), provide a short name & description (sufficient for yourself to know what data it is about), indicate whether the data are newly generated/collected or reused, digital or physical, also indicate the type of the data (the kind of content), its technical format (file extension), and an estimate of the upper limit of the volume of the data.

				Only for digital data	Only for digital data	Only for digital data	Only for physical data
Dataset Name	Description	New or reused	Digital or Physical	Digital Data Type	Digital Data format	Digital data volume (MB/GB/TB)	Physical volume
		Please choose from the following options: • Generate new data	*Please choose from the following options:* • Digital • Physical	*Please choose from the following options:* • Experimental • Compiled/aggregated data • Software	*Please choose from the following options:* • .por, .xml, .tab, .csv,.pdf, .txt, .rtf, .dwg, .gml, … • NA	*Please choose from the following options:* • <100MB • <1GB • <100GB • <1TB • <5TB • <10TB • <50TB • >50TB • NA	
Samples	Samples prepared for experiments	New	Physical	Experimental	na	na	Few hundred samples
Researcher's notebooks	Notebooks used during the experiments/results discussions	New	Physical	Compiled data	na	na	Around 2 notebooks per researcher/year
Experimental data	Raw data from different characterization techniques	New	Digital	Experimental	.csv .txt .oif .tiff .jpg	<100GB	
Analysed data	Reports, figures, presentations, data mining	New	Digital	Compiled data	.pdf .txt .pptx	<1GB	
Electronic lab notebooks	Short description of experiments and researcher observations	New	Digital	Compiled data	.txt .pdf	<1GB	
Meeting minutes	Summary of meetings between project members	New	Digital	Compiled data	.pdf	<100MB	

If you reuse existing data, please specify the source, preferably by using a persistent identifier (e.g. DOI, Handle, URL etc.) per dataset or data type:

NA

Are there any ethical issues concerning the creation and/or use of the data (e.g. experiments on humans or animals, dual use)? Describe these issues in the comment section. Please refer to specific datasets or data types when appropriate.

- No

Will you process personal data? If so, briefly describe the kind of personal data you will use in the comment section. Please refer to specific datasets or data types when appropriate.

- No

Does your work have potential for commercial valorization (e.g. tech transfer, for example spin-offs, commercial exploitation, …)? If so, please comment per dataset or data type where appropriate.

- No

Do existing 3rd party agreements restrict exploitation or dissemination of the data you (re)use (e.g. Material/Data transfer agreements/ research collaboration agreements)? If so, please explain in the comment section to what data they relate and what restrictions are in place.

- No

Are there any other legal issues, such as intellectual property rights and ownership, to be managed related to the data you (re)use? If so, please explain in the comment section to what data they relate and which restrictions will be asserted.

- No

2. Documentation and Metadata

Clearly describe what approach will be followed to capture the accompanying information necessary to keep data understandable and usable, for yourself and others, now and in the future (e.g., in terms of documentation levels and types required, procedures used, Electronic Lab Notebooks, README.txt files, Codebook.tsv etc. where this information is recorded).

An electronic lab notebook will be created for each researcher. This notebook will contain for each relevant experiment for the research a brief description of the sample used with the basic information of synthesis, the parameters used for measuring, and the researcher's observations.
Daily creation of this electronic lab notebook is not necessary, but in relevant experiment for the project should be included.
The experimental data will be recorded with a very descriptive file name (for example: date_material_synthesis conditions) in such a way that all the data can be re-analysed in the future if needed and the samples can be reproduced. These data will be stored in individual folders depending on the experimental setups used. Through this storage protocol, all the data can be recovered, understood, and compared with the researcher's notebooks.
The data analysis will be stored in individual folders and a readme file describing the procedure will be included. The new analysis and experiments procedures will be detailed written to create a Standard Operating Procedure and will be stored in a shared folder so the reproducibility of results will be guaranteed.
The main results will be periodically reported in PDF files, where the data analysis carried out, experimental conditions, and observations will be explained and included.

Will a metadata standard be used to make it easier to find and reuse the data? If so, please specify (where appropriate per dataset or data type) which metadata standard will be used. If not, please specify (where appropriate per dataset or data type) which metadata will be created to make the data easier to find and reuse.

- No

3. Data storage & back-up during the research project

Where will the data be stored?

All the electronics data generated during the project will be stored on local computers just as shared in OneDrive shared folder, to where all the involved researchers will have access.
Regarding the physical data, the samples will be stored in the proper place considering the special conditions required for each type of sample (glovebox, desiccator, regular box). The researcher's notebooks will be accessible in the office of the researchers.

How will the data be backed up?

The digital data in local computers must be updated in the OneDrive space weekly. In addition, periodical backups in the KU Leuven network K-drive of the research group (\\ICTS-S-DFS5.luna.kuleuven.be\archive\SET-cMACS-ResearchData-D0758) will be saved. The TeraCopy Software will be used for these backups to avoid potential copy fails.
At UGent, the data will be preserved during and 5 years after the project. This happens in collaboration with the IT managers of the department and UGent DICT, who offers protected network locations for long-term storage. Data originating from experimental setups is stored on instrumentation PCs and backed up daily to these protected network locations. Synchrotron data is stored on a dedicated network location. All data stored on the fellow's pc is backed up to OneDrive. After the project, this data will be copied to the protected network location, so that it is Findable, Accessible, Interoperable and Re-usable (FAIR) to other researchers in the group.

Is there currently sufficient storage & backup capacity during the project? If yes, specify concisely.
If no or insufficient storage or backup capacities are available, then explain how this will be taken care of.

- Yes

The amount of digital storage capacity expected in this project is easily addressed with the regular capacity of local computers and K-drive space. So, no extra storage will be needed.

How will you ensure that the data are securely stored and not accessed or modified by unauthorized persons?

The digital data will be stored mainly in local computers managed by IT services and OneDrive space. Both one and the other require access through username and password, and only authorized persons will be granted access.

What are the expected costs for data storage and backup during the research project? How will these costs be covered?

It is not expected that storage and backups create extra costs. Access to OneDrive is provided by KU Leuven and the storage in local computers will be done in existing computers. In the case of new storage elements will be required, they will be covered by the running projects at that moment.

4. Data preservation after the end of the research project

Which data will be retained for at least five years (or longer, in agreement with other retention policies that are applicable) after the end of the project? In case some data cannot be preserved, clearly state the reasons for this (e.g. legal or contractual restrictions, storage/budget issues, institutional policies...).

The whole digital data will be stored for at least 5 years. The volume of digital data should not be higher than a few hundred Gbs, so it will not be a problem to store them for a long time.
On the other hand, the physical data related to compiled data (i.e. relevant lab notebook pages) will be digitalized and stored for a minimum of 5 years with those other digital data.
In the case of sample storage, only critical or non-reproducible samples (for cost, materials, or time-consuming reasons) will be properly stored for the required time.

Where will these data be archived (stored and curated for the long-term)?

All digital data will be stored in the K-drive for a long time.
Critical samples (criteria defined previously) will be stored properly in lab 00.541 (preparation laboratory) or glovebox 00.719 in the Nanocenter building (Celestijnenlaan 200J, 3001 Leuven).
Samples storage of metallic films and Lab-On-Chip will be store in the CoCooN group facilities in the S1 building of the University of Ghent, and the Institute of Mechanics, Materials and Civil Engineering (iMMC)facilities in the Réaumur building of the Université Catholique de Louvain.

What are the expected costs for data preservation during the expected retention period? How will these costs be covered?

The data storage is not expected to generate an extra cost since it will be covered by existing technical resources. In case of extra digital solutions will be needed, some of the options offered by KU Leuven for long-term storage will be used. The cost of this long-term storage is around a few hundred euros and will be supported for the running projects at that moment.

5. Data sharing and reuse

Will the data (or part of the data) be made available for reuse after/during the project? In the comment section please explain per dataset or data type which data will be made available.

- Yes, in an Open Access repository

The digital data can be made available for reuse in open access repository if it would be necessary, for example, if they are requested by a scientific journal.

If access is restricted, please specify who will be able to access the data and under what conditions.

N.A.

Are there any factors that restrict or prevent the sharing of (some of) the data (e.g. as defined in an agreement with a 3rd party, legal restrictions)? Please explain in the comment section per dataset or data type where appropriate.

- No

Where will the data be made available? If already known, please provide a repository per dataset or data type.

The KU Leuven possesses its open repository (RDR) where the data can be published.

When will the data be made available?

When all the result has been published the digital data can be made available in an open repository.

Which data usage licenses are you going to provide? If none, please explain why.

General licence of Creative Commons should be applied.
More restrictive licenses can be needed during the project and will be detailed in those cases.

Do you intend to add a PID/DOI/accession number to your dataset(s)? If already available, you have the option to provide it in the comment section.

- No

What are the expected costs for data sharing? How will these costs be covered?

It is not expected extra costs for data sharing. The use of OneDrive folder allows data sharing between the involved researchers. In addition, the volumes of data generated can be transferred using freeware tools for data sharing if needed.

6. Responsibilities

Who will manage data documentation and metadata during the research project?

All the researchers involved are expected to manage the different generated data. Researchers from UCLouvain will manage the data related to the nanomechanical strain engineering and related measurements; researchers from UGent will maintain the data documentation and metadata of metal thin film preparation and characterization; KU Leuven researchers are in charge of the measurements of the results related to metal halide perovskites.

Who will manage data storage and backup during the research project?

One of the researchers involved in the project from each one of the institutions will be responsible for keeping updated the provided storage resources with the newly generated data. One of the involved researchers will be charged with the backup copy in the group’s internal folder.

Who will manage data preservation and sharing?

The co-promotors of the project are in the charge of the preservation and sharing of the data in the long term.

Who will update and implement this DMP?

One researcher from the KU Leuven group will be in charge of updating the DMP and adapting it if required to new necessities appeared during the project.