FWO DMP Template - Flemish Standard Data Management Plan

Project supervisors (from application round 2018 onwards) and fellows (from application round 2020 onwards) will, upon being awarded their project or fellowship, be invited to develop their answers to the data management related questions into a DMP. The FWO expects a **completed DMP no later than 6 months after the official start date** of the project or fellowship. The DMP should not be submitted to FWO but to the research co-ordination office of the host institute; FWO may request the DMP in a random check.

At the end of the project, the **final version of the DMP** has to be added to the final report of the project; this should be submitted to FWO by the supervisor-spokesperson through FWO's e-portal. This DMP may of course have been updated since its first version. The DMP is an element in the final evaluation of the project by the relevant expert panel. Both the DMP submitted within the first 6 months after the start date and the final DMP may use this template.

The DMP template used by the Research Foundation Flanders (FWO) corresponds with the Flemish Standard Data Management Plan. This Flemish Standard DMP was developed by the Flemish Research Data Network (FRDN) Task Force DMP which comprises representatives of all Flemish funders and research institutions. This is a standardized DMP template based on the previous FWO template that contains the core requirements for data management planning. To increase understanding and facilitate completion of the DMP, a standardized **glossary** of definitions and abbreviations is available via the following link.

1. General Project Information	
Name Grant Holder & ORCID	Maarten Roeffaers – ORCID: 0000-0001-6582-6514
Contributor name(s) (+ ORCID) & roles	Prof. Maarten Roeffaers (1) – ORCID: 0000-0001-6582-6514 – Co-promotor
	Prof. Hosni Idrissi (3) – ORCID: 0000-0002-1043-5409 – Co-promotor
	Prof. Christophe Detavernier (2) – ORCID: 0000-0001-7653-0858 – Co-promotor
	Dr. Matthias Filez (2) -ORCID: 0000-0002-7810-637X – Researcher
	M.Sc. Arno Depoorter (2) – PhD student
	Dr. Michaël Coulombier (3) – ORCID: 0000-0002-0025-5711 – Researcher
	M.Sc. Salah Eddine Naceri (3) – PhD student
	Dr. Rafikul Ali Saha (1) – ORCID: 0000-0002-9651-6938 – Researcher
	Dr. Giedrius Degutis (1) – Researcher
	Dr. Rocío Ariza (1) – ORCID: 0000-0003-2179-5757 - Researcher
Project number[1] & title	G0A5923N
	Modulating Energy Efficiency in Model Thin Film Energy Materials by Active Strain
Funder(s) GrantID[2]	G0A5923N

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[1] "Project number" refers to the institutional project number. This question is optional since not every institution has an internal project number different from the GrantID. Applicants can only provide one project number.

[2] Funder(s) GrantID refers to the number of the DMP at the funder(s), here one can specify multiple GrantIDs if multiple funding sources were used.

Affiliation(s)	☒ KU Leuven (1)
	☐ Universiteit Antwerpen
	☒ Universiteit Gent (2)
	☐ Universiteit Hasselt
	☐ Vrije Universiteit Brussel
	☒ Other: Université catholique de Louvain (3)
	Provide ROR[3] identifier when possible:
	KU Leuven – 05f950310
	Universiteit Gent – 00cv9y106
	Université catholique de Louvain – 02495e989
Please provide a short project description	In this project, we will implement controlled levels of elastic strain as an external stimulus and explore this as a 'clean', generic, and highly controllable approach for influencing the BULK and SURFACE properties of (i) metal electrocatalysts and (ii) metal halide perovskite optoelectronic devices. Transferring both advanced static and dynamic external strain stimuli up to high elastic strain limits while having the ability to apply electric bias will push the thin film structure, properties, and performance to unexplored ranges. On the road, the ambition is also to push the limits of nanomechanical testing and fundamental investigation of the elementary deformation mechanisms in small objects in extreme environments.

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[3] Research Organization Registry Community. https://ror.org/

2. 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[4].

Dataset Name	Description	New or Reused	Digital or Physical	*ONLY FOR DIGITAL DATA* Digital Data Type	*ONLY FOR DIGITAL DATA* Digital Data Format	*ONLY FOR DIGITAL DATA* Digital Data Volume (MB, GB, TB)	*ONLY FOR PHYSICAL DATA* Physical Volume
Samples	Samples prepared for the experiments	☒ Generate new data ☐ Reuse existing data	☐ Digital ☒ Physical	☐ Observational ☒ Experimental ☐ Compiled/ aggregated data ☐ Simulation data ☐ Software ☐ Other ☐ NA	☐ .por ☐ .xml ☐ .tab ☐ .csv ☐ .pdf ☐ .txt ☐ .rtf ☐ .dwg ☐ .tab ☐ .gml ☐ other: ☐ NA	☐ < 100 MB ☐ < 1 GB ☐ < 100 GB ☐ < 1 TB ☐ < 5 TB ☐ < 10 TB ☐ < 50 TB ☐ > 50 TB ☐ NA	Few hundred samples
Researcher's notebooks	Notebooks used during the experiments/results discussions	Generate new data	Physical	Compiled data	-	-	Around 2 notebooks per researcher/year
Experimental data	Raw data from the different	Generate new data	Digital	Experimental	.csv .txt	< 100 GB	

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[4] Add rows for each dataset you want to describe.

					.oif .tiff .jpg		
characterization techniques							
Analysed data	Reports, figures, presentations, data mining	Generate new data	Digital	Compiled data	.pdf .txt .pptx	< 1 GB	
Electronic lab notebooks	Short description of experiments and researcher observations	Generate new data	Digital	Compiled data	.txt .pdf	< 1 GB	
Meeting minutes	Summary of meetings between project members	Generate new data	Digital	Compiled data	.pdf	< 100 MB	

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.	No reuse of existing data.
Are there any ethical issues concerning the creation and/or use of the data (e.g. experiments on humans or animals, dual use)? If so, please describe these issues further and refer to specific datasets or data types when appropriate.	☐ Yes, human subject data ☐ Yes, animal data ☐ Yes, dual use ☒ No If yes, please describe:

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[5] These data are generated by combining multiple existing datasets.

Will you process personal data[6]? If so, briefly describe the kind of personal data you will use. Please refer to specific datasets or data types when appropriate. If available, add the reference to your file in your host institution's privacy register.	☐ Yes ☒ No If yes: - Short description of the kind of personal data that will be used: - Privacy Registry Reference:
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.	☐ Yes ☒ No If yes, please comment:
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 to what data they relate and what restrictions are in place.	☐ Yes ☒ No If yes, please explain:
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 to what data they relate and which restrictions will be asserted.	☐ Yes ☒ No If yes, please explain:

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[6] See Glossary Flemish Standard Data Management Plan

3. 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 which metadata standard will be used. If not, please specify which metadata will be created to make the data easier to find and reuse. *REPOSITORIES COULD ASK TO DELIVER METADATA IN A CERTAIN FORMAT, WITH SPECIFIED ONTOLOGIES AND VOCABULARIES, I.E. STANDARD LISTS WITH UNIQUE IDENTIFIERS.*	☐ Yes ☒ No If yes, please specify (where appropriate per dataset or data type) which metadata standard will be used: If no, please specify (where appropriate per dataset or data type) which metadata will be created: There is no metadata standard in the research field. Nevertheless, the protocol specified previously should make all the data accessible and easy to reuse.

4. 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? *What storage and backup procedures will be in place to prevent data loss? Describe the locations, storage media and procedures that will be used for storing and backing up digital and non-digital data during research.*[7] *Refer to institution-specific policies regarding backup procedures when appropriate.*	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 ☐ No If yes, please specify concisely: 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. If no, please specify:
How will you ensure that the data are securely stored and not accessed or modified by unauthorized persons? *Clearly describe the measures (in terms of physical security, network security, and security of computer systems and files) that will be taken to ensure that stored and transferred data are safe.*[7]	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.

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[7] Source: Ghent University Generic DMP Evaluation Rubric: https://osf.io/2z5g3/

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.

5. 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.

6. Data Sharing and Reuse	
Will the data (or part of the data) be made available for reuse after/during the project? Please explain per dataset or data type which data will be made available. *NOTE THAT 'AVAILABLE' DOES NOT NECESSARILY MEAN THAT THE DATA SET BECOMES OPENLY AVAILABLE, CONDITIONS FOR ACCESS AND USE MAY APPLY. AVAILABILITY IN THIS QUESTION THUS ENTAILS BOTH OPEN & RESTRICTED ACCESS. FOR MORE INFORMATION: HTTPS://WIKI.SURFNET.NL/DISPLAY/STANDARDS/INFO-EU-REPO/#INFOEUREPO-ACCESSRIGHTS*	☒ Yes, in an Open Access repository ☐ Yes, in a restricted access repository (after approval, institutional access only, …) ☐ No (closed access) ☐ Other, please specify: 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.	
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 per dataset or data type where appropriate.	☐ Yes, privacy aspects ☐ Yes, intellectual property rights ☐ Yes, ethical aspects ☐ Yes, aspects of dual use ☐ Yes, other ☒ No If yes, please specify:
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? *THIS COULD BE A SPECIFIC DATE (DD/MM/YYYY) OR AN INDICATION SUCH AS 'UPON PUBLICATION OF RESEARCH RESULTS'.*	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. *A DATA USAGE LICENSE INDICATES WHETHER THE DATA CAN BE REUSED OR NOT AND UNDER WHAT CONDITIONS. IF NO LICENCE IS GRANTED, THE DATA ARE IN A GREY ZONE AND CANNOT BE LEGALLY REUSED. DO NOTE THAT YOU MAY ONLY RELEASE DATA UNDER A LICENCE CHOSEN BY YOURSELF IF IT DOES NOT ALREADY FALL UNDER ANOTHER LICENCE THAT MIGHT PROHIBIT THAT.* *EXAMPLE ANSWER: E.G. "DATA FROM THE PROJECT THAT CAN BE SHARED WILL BE MADE AVAILABLE UNDER A CREATIVE COMMONS ATTRIBUTION LICENSE (CC-BY 4.0), SO THAT USERS HAVE TO GIVE CREDIT TO THE ORIGINAL DATA CREATORS." [8]*	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, please provide it here. *INDICATE WHETHER YOU INTEND TO ADD A PERSISTENT AND UNIQUE IDENTIFIER IN ORDER TO IDENTIFY AND RETRIEVE THE DATA.*	☐ Yes ☒ No If yes:
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.

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[8] Source: Ghent University Generic DMP Evaluation Rubric: https://osf.io/2z5g3/

7. 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.