

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	Viktor Naenen 0000-0002-9244-0833
Contributor name(s) (+ ORCID) & roles	Francisco Molina-Lopez 0000-0002-4329-4059, Promotor Jozef Vleugels 0000-0003-4432-4675, Co-Promotor
Project number ¹ & title	11K9223N – Stretchable MXene-elastomer nanodielectrics for skin electronics
Funder(s) GrantID ²	
Affiliation(s)	<input checked="" type="checkbox"/> KU Leuven <input type="checkbox"/> Universiteit Antwerpen <input type="checkbox"/> Universiteit Gent <input type="checkbox"/> Universiteit Hasselt <input type="checkbox"/> Vrije Universiteit Brussel <input type="checkbox"/> Other: Provide ROR ³ identifier when possible:
Please provide a short project description	Skin-electronics is an emerging technology important for medical testing and connecting to the Internet of Things. For better user comfort, they should be soft and stretchy like skin. This project proposes making stretchable thin-film dielectrics with well-dispersed and aligned MXenes, which have good properties for skin-like transistors. MXenes are promising 2D materials that do not degrade when integrated in nanodielectrics. The project aims to understand how strain affects the microstructure and properties of MXene-elastomer nanocomposites for their optimization in strain-invariant, truly stretchable transistor.

2. Research Data Summary

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.

³ Research Organization Registry Community. <https://ror.org/>

List and describe all datasets or research materials that you plan to generate/collect or reuse during your research project.				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	Physical Volume
Microscopy Images	SEM and TEM	Generate	Digital	Experimental	.tif	100 GB	
X-ray diffraction patterns	Crystallography characterization by (2D) XRD	Generate	Digital	Experimental	TIFF	10 GB	
Thickness measurement	Thickness and profile by AFM	Generate	Digital	Experimental	Nid	100 GB	
X-ray fluorescence spectroscopy	Chemical composition by XRF	Generate	Digital	Experimental	.txt	10 GB	
UV-VIS	Chemical composition by UV-VIS	Generate	Digital	Experimental	.txt	10 GB	
Mechanical analysis	Dynamic Mechanical Analysis and tensile testing	Generate	Digital	Experimental	.zdat & TXT	10 GB	
Electrical measurement	By EIS or LCR meter	Generate	Digital	Experimental	.txt	10 GB	
Viscosity	Ubbelohde	Generate	Digital	Experimental	.txt	1 GB	
TGA and DSC	phase characterization	Generate	Digital	Experimental	.txt	1 GB	
FEM models for electrical simulations	In Comsol	Generate	Digital	Software	.mph	10 GB	
Lab Notes	On Remarkable, synchronized to laptop	Generate	Digital	Other: lab notes	.pdf	100 GB	
Scripts for data analysis	(Matlab) scripts for data analysis	Generate	Digital	Software	.m	10 GB	
Samples	Experiment samples	Generate	Physical				Storage box @MTM

<p>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.</p>	<p>Not Applicable</p>
<p>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.</p>	<p> <input type="checkbox"/> Yes, human subject data <input type="checkbox"/> Yes, animal data <input type="checkbox"/> Yes, dual use <input checked="" type="checkbox"/> No If yes, please describe: </p>
<p>Will you process personal data⁴? 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.</p>	<p> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes: <ul style="list-style-type: none"> - Short description of the kind of personal data that will be used: - Privacy Registry Reference: </p>
<p>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.</p>	<p> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, please comment: </p>

⁴ See Glossary Flemish Standard Data Management Plan

<p>Do existing 3rd party agreements restrict exploitation or dissemination of the data you (re)use (e.g. Material/Data transfer agreements, research collaboration agreements)?</p> <p>If so, please explain to what data they relate and what restrictions are in place.</p>	<p><input type="checkbox"/> Yes</p> <p><input checked="" type="checkbox"/> No</p> <p>If yes, please explain:</p>
<p>Are there any other legal issues, such as intellectual property rights and ownership, to be managed related to the data you (re)use?</p> <p>If so, please explain to what data they relate and which restrictions will be asserted.</p>	<p><input type="checkbox"/> Yes</p> <p><input checked="" type="checkbox"/> No</p> <p>If yes, please explain:</p>

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).

Experimental data allows computer interpretability thus will be open-access for reuse, requiring:

- 1) Much data, by sharing all data during this research (also failed experiments) to chart the design space.
- 2) Standardization using hierarchical data structures, e.g. the PIF (physical information file) format: it stores structure, processing history, and properties of materials, devices, and physical systems.

Our research group is part of a KULeuven pilot joining the iRODS consortium, which enables researchers to more effectively find, access, share and reuse data on the basis of meta-data.

Lab observations are stored on a tablet and synchronized to iRODS.
I use the same template for all lab notes and reports.
These are also used for standard operating procedure (SOP) manuals often used by coworkers.

I think it is unfortunate that information/work gets lost and we have to redo our predecessor's tasks.
That is why I develop my scripts for automating repetitive tasks/analysis to work for any pc,
with extensive README.txt files and dedicated training/information videos to explain it in a concise way.

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:

We use the following template for iRODS:

Collection: Experimental_raw_data			
User	Project	Instrument	Date_experiment
FML <- Francisco	ERC-3DALIGN	LFA	dd/mm/yyyy
YT <- Yuan tian	FWO-PhD <- Yuan	LSR	
HEB <- Hasan	FWO-OPV	DMC <- Keyence	XRD_D2 <- XRD D2
BZ <- Bokai	FLOF-OPV <- Tanmay	ELI <- Ellipsometer	XRD_D8
TYC <- Jean	MXene	CONF <- Sensofar confocal	(GI)WAXS
TYT <- Thomas	C1-ITE <- Isidro	AFM	UV-Vis
VN <- Viktor Naenen	IDN-OTE	SEM	Raman
TS <- Tanmay Sinha	EOS-Weyl <- Heyi	EDS	DASA_ST <- Surface tension
IFC <- Isidro Florenciano Cano		TEM	DASA_CA <- Contact angle
HX <- Heyi Xia		ICP-OES	TGA
		WDXRF	DSC
Values		Microscope	Rheo <- Rheometer MTM or ChemEng
		MM <- Multimeter	Potentiostat
		SMU <- Source/meter units	3DP <- Code/layout extrusion 3D printer
		IP <- Inkjet printer	SBK <- Seebeck (home setup V1)
Collection: Processed_data			
User	Project	Type	Date
FML <- Francisco	ERC-3DALIGN	Presentation	dd/mm/yyyy
YT <- Yuan tian	FWO-PhD	Figure	
HEB <- Hasan	FWO-OPV	Report	
BZ <- Bokai	FLOF-OPV	Paper	
TYC <- Jean	MXene	Code	
TYT <- Thomas	IDN-OTE		
VN <- Viktor Naenen	EOS-Weyl <- Heyi		
TS <- Tanmay Sinha			
Collection: Research			
User	Project	Type	Date
FML <- Francisco	ERC-3DALIGN	Literature	dd/mm/yyyy
YT <- Yuan tian	FWO-PhD	SOP	
HEB <- Hasan	FWO-OPV	Material	
BZ <- Bokai	FLOF-OPV	Equipment	
TYC <- Jean	MXene	Method	
TYT <- Thomas	IDN-OTE	Proposal	
VN <- Viktor Naenen	EOS-Weyl <- Heyi	Presentation	
TS <- Tanmay Sinha	NA <- Not applies	Report	

4. Data Storage & Back-up during the Research Project

Where will the data be stored?	iRODS for crucial information (manuals, presentations, reports, measurement data for publication) KULeuven personal drive for all intermediate data
How will the data be backed up? <i>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.⁵ REFER TO INSTITUTION-SPECIFIC POLICIES REGARDING BACKUP PROCEDURES WHEN APPROPRIATE.</i>	All measurement data will be stored on the KULeuven personal drive and kept on the measurement equipment/PC where possible. All crucial information will also be stored on iRODS. Physical samples are stored in sample boxes in the lab/departmental storageroom.
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.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, please specify concisely: The estimated storage and backup capacity (<300 GB) is available.
How will you ensure that the data are securely stored and not accessed or modified by unauthorized persons? <i>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.⁵</i>	Both on the KULeuven personal drive and on iRODS there are strict authorizations in place so no external/unauthorized user can access the data. Each KULeuven-associated PC requires username and password, which must be changed every year.
What are the expected costs for data storage and backup during the research project? How will these costs be covered?	My research group has a minor cost of 30 EUR per year for 2 TB storage in iRods

⁵ Source: Ghent University Generic DMP Evaluation Rubric: <https://osf.io/2z5g3/>

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...).	All data of section 2 will be retained for the expected 5 years after the end of the project.
Where will these data be archived (stored and curated for the long-term)?	The data will be stored on the university's central servers (with automatic back-up procedures) for at least 10 years, conform the KU Leuven RDM policy.
What are the expected costs for data preservation during the expected retention period? How will these costs be covered?	The data will be stored on the university's central servers for at least 10 years for free. Extra generated costs will be afforded by the research group.

6. Data Sharing and Reuse

<p>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.</p> <p><i>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</i></p>	<p><input type="checkbox"/> Yes, in an Open Access repository</p> <p><input checked="" type="checkbox"/> Yes, in a restricted access repository (after approval, institutional access only, ...)</p> <p>The full dataset (except for some unpublished SOPs and other know-how-related files) will be uploaded in Zenodo or the Open Science Framework (for KU Leuven community) under a CC-BY license.</p> <p><input type="checkbox"/> No (closed access)</p> <p><input type="checkbox"/> Other, please specify:</p>
<p>If access is restricted, please specify who will be able to access the data and under what conditions.</p>	<p>The full dataset will be transferred to my supervisor and will be stored on the university's central servers. He or the future students could reuse the data with the approval from my PhD supervisor and me.</p> <p>The valuable data will be written into research papers.</p> <p>The paper-related information could be shared upon request by mail.</p>
<p>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.</p>	<p><input type="checkbox"/> Yes, privacy aspects</p> <p><input type="checkbox"/> Yes, intellectual property rights</p> <p><input type="checkbox"/> Yes, ethical aspects</p> <p><input type="checkbox"/> Yes, aspects of dual use</p> <p><input type="checkbox"/> Yes, other</p> <p><input checked="" type="checkbox"/> No</p> <p>If yes, please specify:</p>

<p>Where will the data be made available? If already known, please provide a repository per dataset or data type.</p>	Not already known
<p>When will the data be made available? <i>THIS COULD BE A SPECIFIC DATE (DD/MM/YYYY) OR AN INDICATION SUCH AS 'UPON PUBLICATION OF RESEARCH RESULTS'.</i></p>	UPON PUBLICATION OF RESEARCH RESULTS
<p>Which data usage licenses are you going to provide? If none, please explain why. <i>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.</i></p> <p><i>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."</i>⁶</p>	The full dataset (except for some unpublished SOPs and other know-how-related files) will be uploaded in Zenodo or the Open Science Framework (for KU Leuven community) under a CC-BY-NC license
<p>Do you intend to add a PID/DOI/accession number to your dataset(s)? If already available, please provide it here. <i>INDICATE WHETHER YOU INTEND TO ADD A PERSISTENT AND UNIQUE IDENTIFIER IN ORDER TO IDENTIFY AND RETRIEVE THE DATA.</i></p>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes:

⁶ Source: Ghent University Generic DMP Evaluation Rubric: <https://osf.io/2z5g3/>

What are the expected costs for data sharing? How will these costs be covered?	The data sharing through university server is free. The data shared through publication will be charged a fee. The fee will be covered by the FWO bench fee.
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7. Responsibilities

Who will manage data documentation and metadata during the research project?	day-to-day data management: Viktor Naenen overall data management, in the long term and after completion of the project: Francisco Molina-Lopez
Who will manage data storage and backup during the research project?	day-to-day data management: Viktor Naenen overall data management, in the long term and after completion of the project: Francisco Molina-Lopez Viktor Naenen is in charge of data back-up on the university server (shared drive and iRODS)
Who will manage data preservation and sharing?	day-to-day data management: Viktor Naenen overall data management, in the long term and after completion of the project: Francisco Molina-Lopez
Who will update and implement this DMP?	Viktor Naenen (with support from Francisco Molina-Lopez)