

FWO DMP Template - Flemish Standard Data Management Plan

Version KU Leuven

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	Junru Wang https://orcid.org/0000-0001-7344-4137
Contributor name(s) (+ ORCID) & roles	
Project number ¹ & title	1SHI624N Environment-friendly flexible zinc-ion batteries: engineering for improved performance and durability
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: ROR identifier KU Leuven: 05f950310
Please provide a short project description	<p>The rapid development of wearable electronics faces the drawbacks of Li-ion batteries as flexible battery systems, such as potential explosion, anticipated rapidly increasing cost, and complex manufacturing. Aqueous zinc-ion batteries (ZIBs) are favourable alternatives thanks to their safety, lower cost, and high theoretical capacity. Nevertheless, issues such as poor cycling stability, low practical performance, and limited flexibility of ZIBs still hinder their applications in wearables. I aim to develop environment-friendly flexible ZIBs with better performance and stability.</p> <p>The specific objectives are to (i) synthesize better-performing Mn-based cathodes through a novel coating-doping combination strategy, (ii) optimize the stability of zinc anode by developing electrolyte additives, (iii) develop tough conductive hydrogel electrolyte with self-repairing function, and (iv) explore suitable electrode printing techniques for 1D/2D flexible ZIBs. Besides performance and stability enhancement, I will focus on low cost and environmental-friendliness of materials during fabrication process. The project will deliver a flexible ZIB prototype suitable for providing power to diverse wearable electronics, and as an environment-friendly, safe, cost-efficient alternative to lithium-ion batteries.</p>

¹ "Project number" refers to the institutional project number. This question is optional. 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.

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 ³.

Dataset Name	Description	New or Reused	Digital or Physical	ONLY FOR DIGITAL DATA	ONLY FOR DIGITAL DATA	ONLY FOR DIGITAL DATA	ONLY FOR PHYSICAL DATA
				Digital Data Type	Digital Data Format	Digital Data Volume (MB, GB, TB)	Physical Volume
		<input type="checkbox"/> Generate new data <input type="checkbox"/> Reuse existing data	<input type="checkbox"/> Digital <input type="checkbox"/> Physical	<input type="checkbox"/> Audiovisual <input type="checkbox"/> Images <input type="checkbox"/> Sound <input type="checkbox"/> Numerical <input type="checkbox"/> Textual <input type="checkbox"/> Model <input type="checkbox"/> Software <input type="checkbox"/> Other:		<input type="checkbox"/> < 1 GB <input type="checkbox"/> < 100 GB <input type="checkbox"/> < 1 TB <input type="checkbox"/> < 5 TB <input type="checkbox"/> > 5 TB <input type="checkbox"/> NA	
CAT-S	Cathode synthesis protocol	Generate new data	Digital	Textual & Numerical	PDF	< 1 GB	
ELD-X	Cathode & anode characterization with XRD	Generate new data	Digital	Numerical & Images	txt & png	< 100 GB	
BAT-E	Cathode, anode, electrolyte characterization with electron microscopes	Generate new data	Digital	Images	txt & png	< 100 GB	
ELD-R	Cathode & anode characterization with	Generate new data	Digital	Numerical	txt & xlsx	< 1 GB	

³ Add rows for each dataset you want to describe.

	XPS						
BAT-P	Cathode, anode, electrolyte performance results with electrochemical station & battery testers	Generate new data	Digital	Numerical	txt & xlsx	< 1 GB	
CAT-B	Cathode/assembled battery samples	Generate new data	Physical	Other, prototype			Decimetre size
ANO-S	Anode synthesis protocol	Generate new data	Digital	Textual & Numerical	PDF	< 1 GB	
ANO-B	Anode/assembled battery samples	Generate new data	Physical	Other, prototype			Decimetre size
ELE-S	Electrolyte synthesis protocol	Generate new data	Digital	Textual & Numerical	PDF	< 1 GB	
ELE-C	Electrolyte characterization data through mechanical, DSC & TGA tests	Generate new data	Digital	Numerical	txt	< 1 GB	
ELE-B	Electrolyte samples (with flexible battery)	Generate new data	Physical	Other, prototype			Decimetre size
ASE-S	Cell assembly protocol	Generate new data	Digital	Textual & Numerical	PDF	< 1 GB	
ASE-I	Electrode inks characterization (FTIR, XRD, SEM, etc.) results	Generate new data	Digital	Numerical	txt & xlsx	< 1 GB	
ASE-P	3D-printed cell configuration	Generate new data	Digital	Numerical & model	txt & png & 3dxml	< 100 GB	

ASE-B	Flexible battery samples	Generate new data	Physical	Other, prototype			Decimetre size
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GUIDANCE:
The data description forms the basis of your entire DMP, so make sure it is detailed and complete. It includes digital and physical data and encompasses the whole spectrum ranging from raw data to processed and analysed data including analysis scripts and code. Physical data are all materials that need proper management because they are valuable, difficult to replace and/or ethical issues are associated. Materials that are not considered data in an RDM context include your own manuscripts, theses and presentations; documentation is an integral part of your datasets and should be described under documentation/metadata.
[RDM Guidance on data](#)

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 existing data will be reused in this project.
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, refer to specific datasets or data types when appropriate and provide the relevant ethical approval number.	<input type="checkbox"/> Yes, human subject data; provide SMEC or EC approval number: <input type="checkbox"/> Yes, animal data; provide ECD reference number: <input type="checkbox"/> Yes, dual use; provide approval number: <input checked="" type="checkbox"/> No Additional information:
Will you process personal data ⁴ ? If so, please refer to specific datasets or data types when appropriate and provide the KU Leuven or UZ Leuven privacy register number (G or S number).	<input type="checkbox"/> Yes (provide PRET G-number or EC S-number below) <input checked="" type="checkbox"/> No Additional information:

⁴ See Glossary Flemish Standard Data Management Plan

<p>Does your work have potential for commercial valorization (e.g. tech transfer, for example spin-offs, commercial exploitation, ...)?</p> <p>If so, please comment per dataset or data type where appropriate.</p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If yes, please comment:</p> <p>In this project, I will develop novel cathode, anode and electrolyte with high performance for zinc-ion batteries, with the focus on sustainability and high durability. The project aims to develop flexible zinc-ion battery prototype for wearable usage within a laboratory setting. Only in a follow-up study, the prototype can be further developed towards a product or technology at higher TRL, which can then be licensed to companies.</p> <p>The datasets associated with potential commercial valorization involve:</p> <ol style="list-style-type: none"> 1. CAT-S: Cathode synthesis protocol 2. ANO-S: Anode synthesis protocol 3. ELE-S: Electrolyte synthesis protocol 4. ASE-P: 3D-printed cell configuration
<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 <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 <input checked="" type="checkbox"/> No</p> <p>If yes, please explain:</p>

3. Documentation and Metadata

<p>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).</p> <p><i>RDM guidance on documentation and metadata.</i></p>	<p>For each protocol information, the experimental steps, reaction system, used instrument, involved chemicals, reaction parameters, etc. will be recorded in text documents.</p> <p>For each of the characterization analyses, the measurement procedures and conditions, instrument type, settings, etc will be recorded in text documents.</p> <p>We will add the following metadata for the datasets:</p> <ul style="list-style-type: none"> - CAT-S: details on investigation, investigator, topic and keyword, publication, dataset, datafile, parameters, authorization - ELD-X: details on investigation, investigator, topic and keyword, publication, materials, dataset, datafile, parameters, authorization - BAT-E: details on investigation, investigator, topic and keyword, publication, instruments, dataset, datafile, parameters, authorization - ELD-R: details on investigation, investigator, topic and keyword, publication, materials, dataset, datafile, parameters, authorization - BAT-P: details on investigation, investigator, topic and keyword, publication, instruments, dataset, datafile, parameters, authorization - ANO-S: details on investigation, investigator, topic and keyword, publication, dataset, datafile, parameters, authorization - ELE-S: details on investigation, investigator, topic and keyword, publication, dataset, datafile, parameters, authorization - ELE-C: details on investigation, investigator, topic and keyword, publication, dataset, datafile, parameters, authorization - ASE-S: details on investigation, investigator, topic and keyword, publication, dataset, datafile, parameters, authorization - ASE-I: details on investigation, investigator, topic and keyword, publication, materials, dataset, datafile, parameters, authorization - ASE-P: details on investigation, investigator, topic and keyword, publication, materials, dataset, datafile, parameters, authorization
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<p>Will a metadata standard be used to make it easier to find and reuse the data?</p> <p>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.</p> <p><i>REPOSITORIES COULD ASK TO DELIVER METADATA IN A CERTAIN FORMAT, WITH SPECIFIED ONTOLOGIES AND VOCABULARIES, I.E. STANDARD LISTS WITH UNIQUE IDENTIFIERS.</i></p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If yes, please specify (where appropriate per dataset or data type) which metadata standard will be used: We will use the RDR data repository of KU Leuven. A metadata standard is automatically applied upon depositing the data. The metadata model will include fields that are required, recommended and optional. Using this data repository, the data sets will be findable and reusable.</p> <p>If no, please specify (where appropriate per dataset or data type) which metadata will be created:</p>
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4. Data Storage & Back-up during the Research Project	
<p>Where will the data be stored?</p> <p><i>Consult the interactive KU Leuven storage guide to find the most suitable storage solution for your data.</i></p>	<p> <input type="checkbox"/> Shared network drive (J-drive) <input type="checkbox"/> Personal network drive (I-drive) <input checked="" type="checkbox"/> OneDrive (KU Leuven) <input type="checkbox"/> Sharepoint online <input type="checkbox"/> Sharepoint on-premis <input type="checkbox"/> Large Volume Storage <input type="checkbox"/> Digital Vault <input type="checkbox"/> Other: </p>
<p>How will the data be backed up?</p> <p><i>WHAT STORAGE AND BACKUP PROCEDURES WILL BE IN PLACE TO PREVENT DATA LOSS?</i></p>	<p> <input checked="" type="checkbox"/> Standard back-up provided by KU Leuven ICTS for my storage solution <input type="checkbox"/> Personal back-ups I make (specify) <input type="checkbox"/> Other (specify) </p>

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 The storage facilities of KU Leuven ICTS will be used in this project. Our group's budget and budget for this program is sufficient to acquire enough storage for the project. The amount of storage can be extended if needed. If no, please specify:
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.</i> Guidance on security for research data	KU Leuven has IT specifications for data storage and management. Based on the confidentiality of the data, storage space, possibility to share data with colleagues, type of data, metadata, etc, IT provides tailored solutions. The recommended storage is SharePoint on premise or online site of Teams site. Only the persons involved in the project, such as promoters and I, will be able to access the data. If other (third party) persons or research groups are interested in the data, then I will discuss this with my promoters of the project. Large volume data will be stored on the dedicated platform of the KU Leuven (LVD storage @ drives.kuleuven.be)
What are the expected costs for data storage and backup during the research project? How will these costs be covered?	No extra costs. The platform of Sharepoint, Teams of the Active Data Management Platform, and OneDrive are offered free of charge by KU Leuven.

5. Data Preservation after the end of the Research Project

<p>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...).</p> <p>Guidance on data preservation</p>	<p><input checked="" type="checkbox"/> All data will be preserved for 10 years according to KU Leuven RDM policy</p> <p><input type="checkbox"/> All data will be preserved for 25 years according to CTC recommendations for clinical trials with medicinal products for human use and for clinical experiments on humans</p> <p><input type="checkbox"/> Certain data cannot be kept for 10 years (explain)</p>
<p>Where will these data be archived (stored and curated for the long-term)?</p> <p><i>Dedicated data repositories are often the best place to preserve your data. Data not suitable for preservation in a repository can be stored using a KU Leuven storage solution, consult the interactive KU Leuven storage guide.</i></p>	<p><input checked="" type="checkbox"/> KU Leuven RDR</p> <p><input type="checkbox"/> Large Volume Storage (longterm for large volumes)</p> <p><input type="checkbox"/> Shared network drive (J-drive)</p> <p><input type="checkbox"/> Other (specify):</p>
<p>What are the expected costs for data preservation during the expected retention period? How will these costs be covered?</p>	<p>The related storage solutions are free for staff.</p>

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/#INFOEU-REPO-ACCESSRIGHTS</i></p>	<p> <input type="checkbox"/> Yes, as open data <input type="checkbox"/> Yes, as embargoed data (temporary restriction) <input checked="" type="checkbox"/> Yes, as restricted data (upon approval, or institutional access only) <input type="checkbox"/> No (closed access) <input type="checkbox"/> Other, please specify: Some data regarding the protocol of battery components can be important due to their potential further commercial valorization; therefore, we will keep them confidential, and thus no access to public until patent is issued and granted if applicable. </p>
<p>If access is restricted, please specify who will be able to access the data and under what conditions.</p>	<p>The data will be restricted/embargoed until the work is published or patented. Only the specific investigators involved in the research project, including promoters, me, and some collaborators, will have access to the data during the restriction / embargo period.</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 <input type="checkbox"/> Yes, intellectual property rights <input type="checkbox"/> Yes, ethical aspects <input type="checkbox"/> Yes, aspects of dual use <input type="checkbox"/> Yes, other <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>	<p> <input checked="" type="checkbox"/> KU Leuven RDR <input type="checkbox"/> Other data repository (specify) <input type="checkbox"/> Other (specify) </p>

When will the data be made available?	<input checked="" type="checkbox"/> Upon publication of research results <input type="checkbox"/> Specific date (specify) <input type="checkbox"/> Other (specify)
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 LICENSE 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> Check the RDR guidance on licences for data and software sources code or consult the License selector tool to help you choose.	<input checked="" type="checkbox"/> CC-BY 4.0 (data) <input type="checkbox"/> Data Transfer Agreement (restricted data) <input type="checkbox"/> MIT licence (code) <input type="checkbox"/> GNU GPL-3.0 (code) <input type="checkbox"/> Other (specify)
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>	<input type="checkbox"/> Yes, a PID will be added upon deposit in a data repository <input type="checkbox"/> My dataset already has a PID <input checked="" type="checkbox"/> No
What are the expected costs for data sharing? How will these costs be covered?	The above-mentioned storage types are free for KU Leuven staffs.

7. Responsibilities	
Who will manage data documentation and metadata during the research project?	My promoters and I will make the dataset files along with the metadata. We will ensure uploading and storing the datasets during my PhD and the project.

Who will manage data storage and backup during the research project?	I will take care of data storage and backup during the research project, and I will be supervised in this task by the promotor of the research project.
Who will manage data preservation and sharing?	My promotor from KU Leuven will be responsible for the long term data storage, preservation and sharing of data.
Who will update and implement this DMP?	My promotor will update this DMP and make sure it is implemented.