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	**Xi Zhang & Orcid: 0000-0001-9519-2567**
Contributor name(s) (+ ORCID) & roles	**Promoter: Raf Dewil, Orcid: 0000-0003-4717-5484** **Co-promoter: Deirdre Cabooter, Orcid: 0000-0001-5502-5801**
Project number [1] & title	PDMT2/23/046, Activation of periodate by transitional metal single-atom decorated biochar catalysts for the efficient degradation of pharmaceutically active compounds in wastewater
Funder(s) GrantID [2]	**KU Leuven Internal Funds: Postdoctoral mandate KU Leuven (PDM)**
Affiliation(s)	☑ KU Leuven ☐ Universiteit Antwerpen ☐ Universiteit Gent ☐ Universiteit Hasselt ☐ Vrije Universiteit Brussel ☐ Other: ROR identifier KU Leuven: 05f950310

[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.

Please provide a short project description	Pharmaceutically active compounds (PhACs) are significant emerging contaminants in wastewater, posing risks to the environment and human health. Periodate(PI)-based advanced oxidation processes(AOPs) are highly promising due to PI's chemical stability during transportation and storage, and activation susceptibility. Decorating single transition metal atoms on biochar (SACs@B) combines the advantages of effective homogeneous catalytic materials with the possibility of the reuse of stabilized catalysts, representing one of the most active frontiers in catalysis. There are currently no reports on the activation of PI using such advanced SACs. There is hence an urgent need to fill this research gap. This proposal aims to design, synthesize and implement transition metal single-atom catalysts (i.e., Fe, Cu and Mn) decorated on walnut shell biochar (WSB) for the efficient catalytic activation of PI for the degradation of PhACs. First, innovative WSB and SACs@B will be synthesized and fully characterized. Second, they will be applied for the first time to activate PI to degrade PhACs. Different operating parameters will be optimized. The degradation mechanism will be evaluated through quenching experiments, ESR, XPS, kinetic modelling, and DFT calculations. Finally, Respirometry measurements will be performed to reveal the detoxification effect of treated solutions, and ECOSAR predictive models will be developed to assess the potential acute and chronic toxicity of degradation products.

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].

				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
		☐ Generate new data ☐ Reuse existing data	☐ Digital ☐ Physical	☐ Audiovisual ☐ Images ☐ Sound ☐ Numerical ☐ Textual ☐ Model ☐ Software ☐ Other:		☐ < 1 GB ☐ < 100 GB ☐ < 1 TB ☐ < 5 TB ☐ > 5 TB ☐ NA	
Microscopy Images	SEM, TEM	Generate new data	Digital	Images	.tif .jpg .png	< 100 GB	
XPS, XRD, EDX, BET, FT-IR, XAFS, STEM	Material characterization	Generate new data	Digital	Images Numerical Textual	.txt .csv .pdf .xlsx	< 100 GB	
UV-VIS	Chemical composition by UV-VIS	Generate new data	Digital	Numerical	.txt .xlsx	10 GB	
HPLC	Concentration	Generate new data	Digital	Images,	.dat	< 100 GB	

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

measurements	of the pollutants			Numerical, Textual	.txt .csv .xlsx .pdf		
Modeling data	DFT	Generate new data	Digital	Simulation	.mat / .txt /.top /.JPG /.png /.gif	< 100 GB	
Lab Notes	In notebooks, written details about the different process trials, results, and observations	Generate new data	Physical	-	-	-	5-10 notebook
Electronic lab logbooks	Written details about the different process trials, experimental conditions, and observations	Generate new data	Digital	Images, Textual	.txt .xlsx .docx	< 1 GB	
Samples and catalysts	Experimental samples	Generate new data Reuse existing data	Physical	-	-	-	< 10 cm^3
Experimental protocols, results, conclusions. Analyzed papers	Experimental results, Processed and analyzed experimental data	Generate new data	Digital	Images Numerical Textual Model Origin	.tif .jpg .png .txt .dat .csv .opju .pdf	< 5 TB	

Figures, datasets, drafts of research articles	Experimental results, Processed and analyzed experimental data	Generate new data	Digital	Images Numerical Textual Model Origin	.tif .jpg .png .txt	< 5 TB	

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 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.	Not Applicable
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.	☐ Yes, human subject data; provide SMEC or EC approval number: ☐ Yes, animal data; provide ECD reference number: ☐ Yes, dual use; provide approval number: ☒ 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).	☐ Yes (provide PRET G-number or EC S-number below) ☒ No Additional information:

[4] See Glossary Flemish Standard Data Management Plan

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: It is possible to use it in practical water treatment technology.
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:

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). *RDM guidance on documentation and metadata*.	All collected data will be labelled for each experiment and a table with a summary for every experiment will be provided. This table contains the date at which data was acquired, sample description (name/s of compound/s, concentration/s, and labelling), measurement parameters (Type and model of Instrument), report of results and short conclusion, suggestions towards follow-up experiment. Further, a detailed description of how to prepare the samples (for both successful as well as unsuccessful results) will be written and kept in Microsoft Word in KU Leuven OneDrive with regular backups. All data (experimental raw data, processed data, literature review reports, and presentations related to work progress and conferences) will be stored on the KU Leuven personal drive, and can be provided to interested parties upon request.
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:

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

Where will the data be stored? *Consult the interactive KU Leuven storage guide to find the most suitable storage solution for your data.*	☐ Shared network drive (J-drive) ☐ Personal network drive (I-drive) ☒ OneDrive (KU Leuven) ☐ Sharepoint online ☐ Sharepoint on-premis ☐ Large Volume Storage ☐ Digital Vault ☒ Other: The accepted version of the final manuscripts (+ accessory datasets and supporting information) are submitted in open access journals and in the KU Leuven library's depository.
How will the data be backed up? *WHAT STORAGE AND BACKUP PROCEDURES WILL BE IN PLACE TO PREVENT DATA LOSS?*	☐ Standard back-up provided by KU Leuven ICTS for my storage solution ☒ Personal back-ups I make (specify): The data will be backed-up automatically for remote data storage on a daily basis in the cloud using KU Leuven one-drive storage and kept on the measurement equipment/PC where possible. Additionally, other copies of the data will be kept at different physical locations using portable hard drives. Physical samples are stored in sample boxes in the lab/departmental storage room. ☐ Other (specify)
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 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.* *Guidance on security for research data*	Both during and after the project, data will be stored using the KU Leuven central network drives (as an automatic back-up), and on the OneDrive storage provided by KU Leuven. On KU Leuven personal drive there are strict authorizations in place so no external/unauthorized user can access the data. Each KU Leuven-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?	Using KU Leuven's OneDrive to store data does not require additional payment. I also have a personal hard drive that can be used to store data without paying extra.

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...). *Guidance on data preservation*	☒ All data will be preserved for 10 years according to KU Leuven RDM policy ☐ 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 ☐ Certain data cannot be kept for 10 years (explain)

Where will these data be archived (stored and curated for the long-term)? *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.*	☒ KU Leuven RDR ☐ Large Volume Storage (longterm for large volumes) ☐ Shared network drive (J-drive) ☒ Other (specifiy): KU Leuven Onedrive
What are the expected costs for data preservation during the expected retention period? How will these costs be covered?	Using KU Leuven's onedrive to store data does not require additional payment. I also have a personal hard drive that could also be used to store data without paying extra.

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, as open data ☐ Yes, as embargoed data (temporary restriction) ☒ Yes, as restricted data (upon approval, or institutional access only) ☐ No (closed access) ☐ Other, please specify:

If access is restricted, please specify who will be able to access the data and under what conditions.	All relevant data and findings will be published in peer-reviewed journals that can be accessed online by anyone with access to the relevant website. These publications will also be stored on KU Leuven's Lirias platform and can be accessed by colleagues and students at KU Leuven.
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.	☒ KU Leuven RDR ☐ Other data repository (specify) ☐ Other (specify)
When will the data be made available?	☒ Upon publication of research results ☐ Specific date (specify) ☐ Other (specify)

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.* *Check the RDR guidance on licences for data and software sources code or consult the License selector tool to help you choose.*	☒ CC-BY 4.0 (data) ☐ Data Transfer Agreement (restricted data) ☐ MIT licence (code) ☐ GNU GPL-3.0 (code) ☐ Other (specify)
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, a PID will be added upon deposit in a data repository ☐ My dataset already has a PID ☐ No
What are the expected costs for data sharing? How will these costs be covered?	Using KU Leuven's OneDrive to share data does not require additional payment. I also have a personal hard drive that could also be used to share data without paying extra.

7. Responsibilities	
Who will manage data documentation and metadata during the research project?	Xi Zhang
Who will manage data storage and backup during the research project?	Xi Zhang
Who will manage data preservation and sharing?	Xi Zhang
Who will update and implement this DMP?	Xi Zhang