
Continuous Monitoring of Diabetes biomarkers (CoMoDi)

A Data Management Plan created using DMPonline.be

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Template: FWO DMP (Flemish Standard DMP)

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Project abstract:

Diabetes mellitus is a class of metabolic diseases characterized by elevated blood glucose levels for a prolonged time. It is a major public health problem with severe personal and societal costs. If untreated, it can lead to serious chronic complications, affecting almost every tissue and organ. For the ideal management of the disease it is essential to replicate the glucose-dependent insulin release of the pancreas. This can be achieved by combining a continuous glucose sensor with an insulin pump, also known as a closed loop insulin delivery system. In the last decade, several technologies have been developed, but their adoption has been hindered by the limited stability of glucose sensors and the unresolved occlusion risks of insulin pumps. CoMoDi aims to overcome the above mentioned limitations by developing the first fully non-enzymatic multianalyte electrochemical sensor for diabetes. The device, fabricated with easily scalable and wafer compatible technologies will be able to continuously monitor glucose, ketones and pH. Aided by first principles simulations novel nano and surface engineering solutions are applied to achieve significant breakthroughs in glucose sensing with unparalleled durability and sensitivity. The first non-enzymatic electrochemical sensor for the ketone beta-hydroxybutyric acid will be developed, granting continuous protection against pump occlusions. CoMoDi will also lead to cutting edge discoveries in the field of chemical sensing and bioengineering

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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
		<i>Please choose from the following options:</i> <ul style="list-style-type: none"> • Generate new data • Reuse existing data 	<i>Please choose from the following options:</i> <ul style="list-style-type: none"> • Digital • Physical 	<i>Please choose from the following options:</i> <ul style="list-style-type: none"> • Observational • Experimental • Compiled/aggregated data • Simulation data • Software • Other • NA 	<i>Please choose from the following options:</i> <ul style="list-style-type: none"> • .por, .xml, .tab, .csv, .pdf, .txt, .rtf, .dwg, .gml, ... • NA 	<i>Please choose from the following options:</i> <ul style="list-style-type: none"> • <100MB • <1GB • <100GB • <1TB • <5TB • <10TB • <50TB • >50TB • NA 	
XPS	surface chemistry analysis	new	<ul style="list-style-type: none"> • Digital 	<ul style="list-style-type: none"> • Experimental • Software 	.vms,.emf,.csv	<ul style="list-style-type: none"> • <100MB 	
XRD/XRR	crystallographic characterization	new	<ul style="list-style-type: none"> • Digital 	<ul style="list-style-type: none"> • Experimental • Software 	.xrdml,.csv	<ul style="list-style-type: none"> • <100MB 	
Electrochemical techniques	chronoamperometry, cyclic voltammetry, impedance spectroscopy	new	<ul style="list-style-type: none"> • Digital 	<ul style="list-style-type: none"> • Experimental 	.txt,.csv,.nox	<ul style="list-style-type: none"> • <1GB 	
SEM	sample morphology characterization	new	<ul style="list-style-type: none"> • Digital 	<ul style="list-style-type: none"> • Experimental 	.tif	<ul style="list-style-type: none"> • <100MB 	
AFM	roughness estimation	new	<ul style="list-style-type: none"> • Digital 	<ul style="list-style-type: none"> • Experimental 	.jpg	<ul style="list-style-type: none"> • <100MB 	
PVD deposition	Sputtering of thin films on glass or silicon wafers.	new	<ul style="list-style-type: none"> • Digital • Physical 	<ul style="list-style-type: none"> • Experimental 	.xlsx	<ul style="list-style-type: none"> • <100MB 	Parameters written on notebook and then copied in an excel spreadsheet

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:

All data will be generated new

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.

- Yes

This work has a clear commercial potential. Both the raw and analyzed data will be kept confidential and shared when appropriate only with the members of the research group. On a case by case basis we will evaluate whether to patent (LRD office) or publish an article on our work.

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).

All protocols and methodology are kept in Excel spreadsheets and shared with the promotor Prof. Irene Taurino. The files are kept on a personal computer and on two different cloud services (Onedrive, Dropbox). Accompanying .readme files explaining the electronic filing system will always be kept in the main directory.

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?

Data will be analyzed and stored on the centrally managed KU Leuven work pc, automatically synchronized with Onedrive (provided by KUL) and Dropox (personal). The promotor has access to this data at every time. Every 6months the data will be backed up on a physical pen drive.

How will the data be backed up?

The data is automatically backed up in onedrive and dropbox. Manually backup every 6 months on a pen drive.

**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

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

Data both on onedrive and dropbox is encrypted and requires authentication to access it. The promotor has a unique link that allows access from her account. Data on the personal workstation is protected by an access password. The data on the pendrive is zipped in a password protected archive.

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

Every KU Leuven employee has 2TB of storage free to use. Dropbox costs 120\$ a year for 2TB, which can easily be covered with the FWO bench fee.

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...).

All of the raw and analyzed data will be stored in the dropbox drive (KU leuven deactivates the microsoft 365 account after graduation) after graduation

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

Dropbox account, paid through the FWO bench fee

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

maximum 600\$, paid by with the FWO bench fee

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
- Yes, in a restricted access repository (after approval, institutional access only, ...)

As a general principle, at the end of the PhD most of the data will be made available in an open access repository. However, some parts may remain confidential due to the potential for commercialization

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

The promotor(s) will always be able to access the restricted data.

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.

- Yes, Intellectual Property Rights

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

This is yet to be defined

When will the data be made available?

After graduation and upon discussion with the LRD office

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

To be discussed with LRD

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.

- Yes

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

During the PhD and after 5 years: see above (FWO bench fee).
Afterwards: to be defined

6. Responsibilities

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

The PhD student will be the primary data documentation and metadata manager during the research project. However, the promotor may periodically check independently the documentation and contribute to the organization.

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

The PhD student (Filippo Franceschini)

Who will manage data preservation and sharing?

The promotor (Irene Taurino)

Who will update and implement this DMP?

The PhD student (Filippo Franceschini)