Innovative nanoswitch-based biosensing technology for bioreactor monitoring

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.

Dataset name / ID	Description	New or reuse	Digital or Physical data	Data Type	File format	Data volume	Physical volume
		Indicate: ***N****(ew data) or* ***E****(xisting data)*	Indicate: **D**(igital) or **P**(hysical)	Indicate: **A**udiovisual **I**mages **S**ound **N**umerical **T**extual **M**odel **SO**ftware Other (specify)		Indicate: <1GB <100GB <1TB <5TB >5TB NA	
Short synthetic DNA sequences to construct nanoswitches (no genetic information)	sequence data	N	D	T	.xlsx, .docx	< 1GB	/
gel electrophoresis data	raw and processed images	N	D	I, N	.scn, .tif,	< 1GB	/
plasmonic microscopy data	raw and processed images	N	D	I, N	.nd2, .tiff, .csv	< 1 TB	/
Spectrophotometer data	raw and processed data	N	D	N	.sda, .csv	< 1GB	/
FO-SPR data	raw and processed data	N	D	N	.txt, .csv, .xlsx	< 100 GB	/
AFM images	raw and processed images	N	D	I, N	.mi, .gwy, .png	< 1GB	/
COMSOL simulation data	simulation files	N	D	M, N	.mph, .csv	< 1 TB	/
labview software for FO-SPR data processing	labview software	N	D	SO	.lvproj	< 1GB	/
Electrochemical measurement data	raw and processed data	N	D	N	.txt, .pssession	< 1 GB	/
Microfluidic chip designs	design files	N	D	Other	.f3d, .stl, .dwg, .dxf, .cif	< 1 GB	/
Data processing and visualization	processed data	N	D	I, N, T	.xlsx, .docx, .tif, .m, .py	< 1 GB	/
Reagents (antibodies, DNA, gold nanoparticles,...)	Reagents	N	P	Other	/	/	one 20 cm x 20 x 5 cm cm box in the freezer and one 30cm x 30 cm x 20 cm box in the fridge

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.

- No

Will you process personal data? 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).

- 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

If research data have potential for patent filing, scientific staff working on this project will discuss this with the IOF manager in the group and LRD to make sure that data are protected prior to publications.

Do existing 3rd party agreements restrict exploitation or dissemination of the data you (re)use (e.g. Material or 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.

- Yes

Data sharing restrictions might potentially apply due to generation of IP. Regular meetings with KU Leuven LRD will be held to evaluate and protect possible IP generated during the project that could lead to valorization actions. If deemed necessary, data that fall under IP will either not be shared, put under embargo, or a suitable license will be applied to the data when published (e.g. Creative Commons License).

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).

The Biosensors group uses the electronic lab notebook in which a number of predetermined topics have to be described for each experiment (objective, samples, protocol, results, and conclusion). Furthermore, physical samples are inventoried via this electronic lab notebook as well, and can be tracked accordingly. For each experiment, the used samples are indicated. The electronic lab notebook facilitates searching for particular metadata through a search engine. By mimicking the folder structure of the electronic lab notebook in the server-based folder with the experimental data, linking of the metadata to the actual data will be facilitated.
As a general rule, datasets will be made openly accessible, whenever possible via existing platforms that support FAIR data sharing (www.fairsharing.org). When depositing data in a local or public repository, the final dataset will be accompanied by this information in a README.txt document, following the Dublin Core Metadata standard if no other meta-standard is available

yet. This file will be located in the top-level directory of the dataset and will also list the contents of the other files and outline the file-naming convention used. This will allow the data to be understood by other members of the laboratory and add contextual value to the dataset for future reuse. For each peer-reviewed article, a separate folder will be made on the server, containing the latest Word version and all raw and processed data used in the article. In addition, a separate file will be made in the electronic lab notebook for each article, containing clickable links to all metadata files of data that were used in that particular article, to facilitate tracing back of protocols, results and conclusions.

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.

- Yes

To guarantee reusable aspect of data, sufficient documentation and methods information will be provided, whereas CC-BY license will be attached to data through data repositories. For more details, please see section 2.1.

Data Storage & Back-up during the Research Project

Where will the data be stored?

- Shared network drive (J-drive)
- Large Volume Storage
- OneDrive (KU Leuven)
- Sharepoint online

How will the data be backed up?

- Standard back-up provided by KU Leuven ICTS for my storage solution

Is there currently sufficient storage & backup capacity during the project?

If no or insufficient storage or backup capacities are available, explain how this will be taken care of.

- Yes

KU Leuven provides sufficient storage and back-up capacity during and after the project. A dedicated folder is made for the project to store data files.

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

The network drive for the project shared folder and the large volume storage folder are secured by the ICTS service of KU Leuven with a mirror copy. Confidential data can and will be protected with a password (available only for PI Jeroen Lammertyn). Visitors, MSc thesis students and internship students in the groups as well as other unauthorized persons will not have access to the data on the shared folder. Data storage in the cloud will be avoided, unless for temporary use only, e.g., to transfer large files between the researchers involved in the project.

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

Type 1 server back-end storage with mirror backup for the project shared folder will be used. Using the shared network drive (J-drive) and large volume storage (K-drive) cost respectively € 450.76 / TB / year and € 95.14 / TB / year. Costs will be covered by the project consumables budget.

Data Preservation after the end of the Research Project

Which data will be retained for 10 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 will be preserved for 10 years according to KU Leuven RDM policy

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

- Large Volume Storage (longterm for large volumes)
- Shared network drive (J-drive)
- KU Leuven RDR

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

The volume corresponding to dissemination data is expected to be relatively low (<10 GB), and therefore can be seamlessly embedded on the (K:) drive of KU Leuven. For research data, at current archiving costs of 10 Euro/(TB*year), we estimate a cost of 30 Euro/year. These costs will be covered by funding acquired by the project PIs in the context of other research projects.

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.

- Yes, as open data

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

Only researchers participating in the project will be able to access the data for the duration of the project. As soon as the article associated with the data is ready for publication, the data will be made open through the institutional repositories mentioned in 2.1. The data will be deposited in the institutional repositories: (KU Leuven: Research Data Repository (RDR) Research Data Repository (RDR) - RDR - Research Data Repository (kuleuven.be). Data will be assigned with DOIs to create trustworthy and persistent links for online content.

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, intellectual property rights

Before making data and other research output from the project (e.g. journal articles, book chapters and conference proceedings) openly available, they will be aligned with the project IP strategy to avoid premature disclosure, which can compromise the patent filing application(s).

Where will the data be made available?

If already known, please provide a repository per dataset or data type.

- KU Leuven RDR (Research Data Repository)

When will the data be made available?

- Upon publication of research results

Which data usage licenses are you going to provide?

If none, please explain why.

- CC-BY 4.0 (data)

Do you intend to add a persistent identifier (PID) to your dataset(s), e.g. a DOI or accession number? If already available, please provide it here.

- Yes, a PID will be added upon deposit in a data repository

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

A restricted access repository can be implemented on a free tool, such as OneDrive, up to a certain
volume. If this volume does not suffice, time-limited storage will be considered, thus limited to the time needed to download the data. The costs associated with data storage will be covered by the budget
foreseen in the project agreement.

Responsibilities

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

Annelies Dillen, Jeroen Lammertyn

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

Annelies Dillen, Jeroen Lammertyn

Who will manage data preservation and sharing?

Annelies Dillen, Jeroen Lammertyn

Who will update and implement this DMP?

Annelies Dillen, Jeroen Lammertyn