

FWO DMP Magnetoelectric Logic

Project Name My plan (FWO DMP) - FWO DMP Magnetoelectric Logic

Project Identifier 1S97822N

Principal Investigator / Researcher Anaïs Guerenneur

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Description Spintronics devices have potential in future ultralow power applications. Currently the control of magnets by spin-transfer or spin-orbit torques has a high energy consumption. Multiferroic magnetoelectric materials, and laminate composites with a layer of piezoelectric material and a layer of magnetostrictive material, could allow for low energy transducers for the control of magnets. The research will focus on the optimisation such compound materials by studying the materials science and basic physics of devices at the nanoscale.

Institution KU Leuven

1. General Information

Name applicant

Anaïs Guerenneur

FWO Project Number & Title

1S97822N

All-magnetoelectric logic devices for ultralow power beyond-CMOS computing applications

Affiliation

- KU Leuven

IMEC

2. Data description

Will you generate/collect new data and/or make use of existing data?

- Generate new data

Describe in detail the origin, type and format of the data (per dataset) and its (estimated) volume. This may be easiest in a table (see example) or as a data flow and per WP or objective of the project. If you reuse existing data, specify the source of these data. Distinguish data types (the kind of content) from data formats (the technical format).

SEM and Microscope images	.tif	10 GB	Microscopes of fabricated samples
XRD, XRR	.csv, .xy	10 GB	X-ray diffraction and reflectivity of deposited materials
VSM	.csv	10 GB	Vibrating-sample magnetometer
Log files	.log	10 GB	Automatically taken by various fabrication and characterisation tools, and by simulation software
Mumax3 data	.ovf	1 TB	Micromagnetic simulations of nanomagnets
Comsol models and data	.mph, .csv	100 GB	COMSOL models of devices and extracted data
HFSS models and data	.aedt, .dat	100 GB	HFSS models of devices and extracted data
AFM	.flt	10 GB	Atomic force microscopy of deposited materials
Electrical characterisation	.dat, .csv	100 GB	Custom setups
Magnetostriction setup	.csv	100 GB	Custom magnetostriction setup
Other characterisation	.dat	100 GB	XPS, TEM, etc. as needed depending on challenges

3. Legal and ethical issues

Will you use personal data? If so, shortly describe the kind of personal data you will use. Add the reference to your file in KU Leuven's Register of Data Processing for Research and Public Service Purposes (PRET application). Be aware that registering the fact that you process personal data is a legal obligation.

- No

Privacy Registry Reference:

Short description of the kind of personal data that will be used:

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, add the reference to the formal approval by the relevant ethical review committee(s)

- No

Does your work possibly result in research data with potential for tech transfer and valorisation? Will IP restrictions be claimed for the data you created? If so, for what data and which restrictions will be asserted?

- No

Do existing 3rd party agreements restrict dissemination or exploitation of the data you (re)use? If so, to what data do they relate and what restrictions are in place?

- No

4. Documentation and metadata

What documentation will be provided to enable reuse of the data collected/generated in this project?

1. Information related to settings are embedded in the microscope/SEM images. Sample reference is in the file name and can be compared to sample reference database
2. XRD and XRR setup information (including optics) are included in the .xrdml file outputs of the tool software. These files are saved in the same folder as the .xy and .csv sample related data. The file names can be compared to the sample reference database
3. Log files from simulations are saved in the same folder as simulation results.
4. Simulation data (COMSOL, mumax3, HFSS) are saved in an automatised format as defined in the simulation software. They can be related to experiments through powerpoint summaries of simulation experiments
5. AFM/VSM/other characterisation experimental data will be written in a labbook
6. Custom setup (electrical characterisation and magnetostriiction) metadata is embedded as comment on top of the data files
7. Characterisation carried out in collaboration is summarised in documents available in the appropriate folders

Will a metadata standard be used? If so, describe in detail which standard will be used. If no, state in detail which metadata will be created to make the data easy/easier to find and reuse.

- No

List of experiments and samples are kept with locations of related information.

Experiment-specific information spreadsheets are kept in the folder related to the experiment.

Relevant labbook data will be saved as text files in the appropriate folder and relevant information will be added to written summaries and presentations.

5. Data storage and backup during the FWO project

Where will the data be stored?

Extensive characterisation and experimental data will be saved in imec's central servers.

Metadata, selected important data, and reports of experiments are saved in clouds (SharePoint and OneDrive).

How is backup of the data provided?

Carried out by imec and cloud service provider (Microsoft)

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

Central servers and clouds are shared and have very large capability.

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

Costs are covered by imec.

Data security: how will you ensure that the data are securely stored and not accessed or modified by unauthorized persons?

Access to the central servers is only possible for specific users after approval by imec.

Data on the group's SharePoint is only accessible by people in the research group, with the exception of specific files shared with collaborators.

6. Data preservation after the FWO project

Which data will be retained for the expected 5 year period after the end of the project? In case only a selection of the data can/will be preserved, clearly state the reasons for this (legal or contractual restrictions, physical preservation issues, ...).

All the data will be retained for 5 years following the end of the project.

Where will the data be archived (= stored for the longer term)?

The data will be left where it is currently saved (imec's central servers and clouds) as capacity is sufficient.

What are the expected costs for data preservation during the retention period of 5 years? How will the costs be covered?

Costs are covered by imec.

7. Data sharing and reuse**Are there any factors restricting or preventing the sharing of (some of) the data (e.g. as defined in an agreement with a 3rd party, legal restrictions)?**

- No

Which data will be made available after the end of the project?

Relevant data will be published in journals or reported in the PhD thesis.

Where/how will the data be made available for reuse?

- Upon request by mail

Procedure to be defined depending on parties involved.

When will the data be made available?

- Upon publication of the research results

Who will be able to access the data and under what conditions?

Data can be accessed by relevant collaborators or other parties upon request.

All data can be shared with FWO and KU Leuven.

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

No costs expected.

8. Responsibilities**Who will be responsible for data documentation & metadata?**

The PI will be responsible for the data documentation and metadata under the supervision of the PI's advisors (Dr. Florin Ciubatoru and Dr. Christoph Adelman) .

Who will be responsible for data storage & back up during the project?

The PI will be responsible for the data storage and backup. Additional back ups of important data are carried out by the PI's advisors (Dr. Florin Ciubatoru and Dr. Christoph Adelman).

Who will be responsible for ensuring data preservation and reuse ?

The PI's advisors (Dr. Florin Ciubatoru and Dr. Christoph Adelman) and other research group members will be responsible for data preservation and reuse.

Who bears the end responsibility for updating & implementing this DMP?

The PI bears the end responsibility of updating & implementing this DMP.