MY PLAN (FWO DMP)

MEMOG

ADMIN DETAILS

Project Name: My plan (FWO DMP) - MeMOG
Grant Title: 1263622N
Principal Investigator / Researcher: Víctor Rubio Giménez
Description: The rapid advancement of the digital era requires novel materials and device concepts for data storage. Memristors are a promising class of memory devices in which information is stored and extracted as changes in the electrical resistance of a storage medium. So far, the working principle and potential of memristors have been illustrated only using readily available 'off-the-shelf' materials without exploring structure-property relationships. However, to reach the understanding and performance required for real-world implementation, tailor-made materials are needed. To this end, the MeMOG project will use metal-organic graphene analogues (MOGs), an emerging class of electronicall tuneable 2D crystalline coordination polymers (CCPs), whose electrical resistance can be reversibly switched by several orders of magnitude. MOG nanofilms will be prepared with precise control over thickness, morphology, and crystallinity via solvent-free chemical vapour deposition (CVD). In contrast with existing solution-based MOG synthesis protocols that use metal salts and organic solvents, the CVD approach avoids corrosion and contamination issues and is therefore compatible with microelectronics fabrication. Thus far, this method has only been used with a limited number of 3D CCPs, MeMOG will adapt the CVD methodology to a wide set of 2D MOGs nanofilms. These MOG layers will be integrated and tested in memristor prototypes for a deeper understanding of their switching mechanism.
Institution: KU Leuven

1. GENERAL INFORMATION

Name applicant
Víctor Rubio Giménez

FWO Project Number & Title
1263622N Vapour deposition of metal-organic graphene analogues for memory devices (MeMOG)

Affiliation
- KU Leuven

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).

The expected data volume generated within MeMOG is around 1 GB per month. The details of raw and exported data formats are listed below:

Equipment	Raw format	Exported format	Estimated volume (GB)
X-ray diffraction	XRDML	CSV	0.5-1
Synchrotron X-ray diffraction	TIF	CSV	100-500
Scanning electron microscopy	TIF or JPEG		1-10
Transmission electron microscopy	TIF or JPEG		1-5
Infrared spectroscopy	BSP	CSV	0.1-0.5
Nuclear magnetic resonance spectroscopy	FID	CSV	0.1-0.5
X-ray photoelectron spectroscopy	SPE	CSV	0.1-0.5
Thermogravimetric analysis	NGB-SS3	CSV	0.1-0.5
Mass spectroscopy	EXP	CSV	0.1-0.5
UV-Vis spectroscopy	SP	CSV	0.1-0.5
Atomic force microscopy	SPM	PNG	1-10
Electrical measurements	CVS		0.1-0.5
Confocal microscopy	PNG		0.1-0.5
Gas sorption data	SMP	CSV	0.1-0.5

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

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?

- Yes

If the proposed concept works, we will work together with KU Leuven tech transfer office to investigate patentability. The base technology of the approach is already protected by a granted patent. In case a patent application will be filed directly resulting from this project, the related data will not be freely shared at least until the patent filing.

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?

An overview file that contains references to the raw data files will be kept. Regular reports based on the data will be generated using Microsoft Word. PowerPoint files will be used for presentation at regular internal meetings between researchers involved in the project. In both the Word reports and PowerPoint presentations, the file names of the raw data files will be included.

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

The details of each experiment will be kept in an electronic lab notebook. In this notebook, also the names of the raw and processed datafiles will be mentioned. Files will be named according to a pre-agreed convention. This working method obviates the need for a separate INFO.txt file in each directory yet ensures that the data can be understood by other team members and can be reused in the future.

For published papers, the subset of the raw and processed data discussed in that manuscript will be copied and organized according the paper structure. Likely, this is the data subset that will be most frequently revisited and shared afterwards.

5. DATA STORAGE AND BACKUP DURING THE FWO PROJECT

Where will the data be stored?

How is backup of the data provided?
The data on the cloud storage server are automatically backed up. Unlimited versioning is included in the selected plan so that accidental erasing or modifying does not pose a risk.

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

The total amount of data generated during the project should not exceed a few TB and is therefore compatible with the selected cloud storage solution.

What are the expected costs for data storage and back up during the project? How will these costs be covered?
The costs for saving the data to the cloud storage server (including regular backup) should not exceed a few hundred euros. These costs will be covered by the project' bench fee or by other funding projects awarded to the supervisor.

Data security: how will you ensure that the data are securely stored and not accessed or modified by unauthorized persons?
The data generated during the project will be systematically transferred to the cloud storage server. Only researchers involved in this project will have access to the shared folders where the data, reports and presentations will be stored.

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 generated data will be stored on the cloud storage server for a period of 5 years after the end of the project.

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

All the generated data will be stored on the cloud storage server for a period of 5 years after the end of the project.
Beyond 5 years after the end of the project, one of the following options will be picked (1) continuation of storing the data on the cloud storage server or (2) transferring the data to the KU Leuven central servers for archiving for at least 10 years, conform the KU Leuven RDM policy.

What are the expected costs for data preservation during the retention period of 5 years? How will the costs be covered?
The annual cost for long-term storage of the data, either through a cloud storage service or the university's central servers, is estimated at a few hundred euro. Since the budget of the current FWO project will no longer be available, creative solutions will have to be found.

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)?

- Yes. Specify:

The data will remain accessible among the researchers involved in the project. Access to the data can be granted to other persons, upon request and agreement to certain conditions. A patent application can be a limiting factor in granting access to the data.

Which data will be made available after the end of the project?
In case no patent restrictions apply, the written reports and PowerPoint presentations summarizing the results obtained can be made available. The (raw) data used in publications can be made available on a repository, if e.g. requested by the Editors or Publisher of a scientific journal.

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

- Upon request by mail

The data that will not have been uploaded in a repository such as 'Scientific data' (https://www.nature.com/sdata/) to accompany a publication can be requested via email.

When will the data be made available?

- Upon publication of the research results

Description of the full scientific method and results will be made available with journal publications.

Who will be able to access the data and under what conditions?
Upon request, access to the samples and data can be granted, upon agreement of the project researchers and supervisor. Commercial reuse will not be allowed.

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

Because of the choice for a cloud storage solution for the data, no additional costs will be booked for data sharing.

8. RESPONSIBILITIES

Who will be responsible for data documentation & metadata?
The principal researcher and supervisor involved in this project will be jointly responsible.

Who will be responsible for data storage & back up during the project?
The principal researcher and supervisor involved in this project will be jointly responsible. Because of the choice for a cloud storage solution, no additional action is needed for data backup.

Who will be responsible for ensuring data preservation and reuse ?
The principal researcher and supervisor involved in this project will be jointly responsible.

Who bears the end responsibility for updating & implementing this DMP?
The principal researcher bears the end responsibility of updating & implementing this DMP.