Active Optical Phase-Change Plasmonic Transdimensional Systems Enabling Femtojoule and Femtosecond Extreme Broadband Adaptive Reconfigurable Devices

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-Open Research Data Pilot-
Data Management Plan

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About Phemtronics

PHEMTRONICS was launched in June 2020 as a 3-year collaborative project on CMOS-compatible phase-change materials, plasmonic, photonic and electronic integration.

PHEMTRONICS aims at replacing "*slow*" electrical or thermal phase change materials with "*ultrafast*" "Optical-Phase-Change Plasmonic Materials", capable of self-reconfiguring and self-adapting as a response to light, shifting from current technology paradigms based on electronic switching to "all-optical switching" enabling broadband reconfigurability of devices.

PHEMTRONICS will enable a new technology paradigm of adaptive optical signal processing with ultrafast network reconfiguration with key metrics of the "femtosecond-scale switching time", "ultralow power of femtojoule/bit" and "microwave-to-optical frequencies" broadband capability required for reliable multibit operations. The exciting outcomes include demonstrations of:

- Ultrafast and low-power switches;
- Adaptive antennas;
- Adaptive switchable multiple-band detection for the future generation of photodetectors;
- All-optical spiking neuron circuit, with integrated all-optical synapses.

Table of Contents

Executive Summary

This deliverable presents the first version of the PHEMTRONICS Data Management Plan (DMP).
PHEMTRONICS participates in Open Research Data (ORD) Pilot, and, therefore, is providing, as requested, the current deliverable six months after the beginning of the project (M6, November 2020).
The DMP is not a fixed document, but it is likely to evolve during the whole lifespan of the project, serving as a working document. This document will be updated as needed during the Project General Assemblies.
The purpose of the DMP is to contribute to good data handling through indicating what research data the project expects to generate and describe which parts of the data that can be shared with the public.
Furthermore, it gives instructions on naming conventions, metadata structure, storing of the research data and how to make public data available.
During the 36 active months of the project, a SharePoint in the private area of the PHEMTRONICS website will be used as the online working and collaboration platform. SharePoint is only accessible to project partners and can provide further access control through establishing folders and sub-sites with stricter access granted than to the main site.
During the project all public datasets will be uploaded to this site and stored in accordance with the privacy strategy of PHEMTRONICS.
PHEMTRONICS will use the open research data repository *Zenodo* to comply with the Horizon 2020 Open Access Mandate. This mandate applies to the underlying research data of publications, but beneficiaries can also voluntarily make other datasets open.
In PHEMTRONICS, all deliverables, publications and PUBLIC datasets will be uploaded to the *European Commission Funded Research (OpenAIRE) Community* in Zenodo. Uploads will be done upon approval of the deliverables by the European Commission, upon publication or acceptance of scientific publications, or, for underlying datasets, at the end of the project at the latest.
Each dataset will be given a persistent identifier (Digital Object Identifier, DOI), supplied with relevant metadata and linked to the project name and grant agreement number.
The DMP is a living document and will be updated during the project. The next version of the DMP will put a strong emphasis on the complete definition of procedures to be implemented by the project to efficiently manage its research data in terms of storage and backup (backup provision, recovery procedure), selection and preservation (which data will be retained/shared/ preserved, length of time data to be preserved and preservation preparation time). At the end of the project to reflect the actual research data generated during the project and include updated instructions for how to access open data.
The maintenance is the responsibility of the Project Coordinator, supported by the Data Controllers.

1. Introduction

This deliverable outlines how research data will be handled during the project and after it is completed. The overall purpose of this Data Management Plan (DMP) is to support the data management life cycle for all data that will be collected, processed or generated by the project. The initial set of the project datasets are grouped as follows:

- DATASET 1: Contact Information, including the consortium and Project external individuals and stakeholders
- DATASET 2: Project files, including data on competitors, providers, literature data for benchmarking purpose
- DATASET 3: Research activities
- DATASET 4: Development data, databases and codes
- DATASET 5: Testing/Prototyping activities

This deliverable presents the tailored data management for those datasets. It will contribute to:

- Ensure project research data and records are accurate, complete, authentic, interoperable and reliable.
- Enhance data security and thereby minimize the risk of data loss.
- Ensure research integrity and reproducibility by others.
- Prevent duplication of effort by enabling others to use the project's data.

The described policy herein reflects the current state of Consortium Agreements (CA) regarding data management and is consistent with those referring to exploitation and protection of results.
It is a living document that is expected to mature during the project lifetime and will be updated accordingly.

1.1 Legal Framework

As of May 2018, the General Data Protection Regulation (GDPR)[1] is applicable in all Member States in the European Union, as well as in the countries in the European Economic Area (EEA). GDPR updates and modernizes existing laws on data protection to strengthen citizens' fundamental rights and guarantee their privacy in the digital age.
GDPR regulates the processing by an individual, a company or an organization of personal data relating to individuals in the EU.[2] It does not apply to the processing of personal data of deceased persons or of legal entities. It sets down one set of data protection rules for all companies and organizations operating anywhere in the EU and European Economic Area (EEA), for two main reasons: 1) to give people more control over their personal data, 2) level the playing field for businesses and organizations operating in the EU and EEA.
GDPR grant individuals a set of rights that must be protected by any actor who processes personal data. The individual rights include the right to:

- information about the processing of your personal data;
- obtain access to the personal data held about you;

[1] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing. Directive 95/46/EC. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32016R0679
[2] https://ec.europa.eu/info/law/law-topic/data-protection/reform/what-does-general-data-protection-regulation-gdprgovern_
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- ask for incorrect, inaccurate or incomplete personal data to be corrected;
- request that personal data be erased when it's no longer needed or if processing it is unlawful;
- object to the processing of your personal data for marketing purposes or on grounds relating to your particular situation;
- request the restriction of the processing of your personal data in specific cases;
- receive your personal data in a machine-readable format and send it to another controller ("data portability");
- request that decisions based on automated processing concerning you or significantly affecting you and based on your personal data are made by natural persons, not only by computers. You can also have the right in this case to express your point of view and to contest the decision.

1.2 Permissions for collecting and handling personal data

All data collected from stakeholders in the project will be processed and handled securely and in line with applicable rules and regulations on privacy and data protection.
Mostly data that are needed to perform project activities will be collected, and as far as possible, participants will not be asked to provide personal data unless this is necessary for survey and/or contact purposes.
Only part of the data collected by PHEMTRONICS will be personal data related to contact information from stakeholders from consultations and survey. In this case, personal data will be collected only upon receiving informed consent from the participants, and any participant providing personal data can at any time withdraw their participation and related data from the project.

2. Data Summary

2.1 Purpose of data collection and generation

The consortium has elected to 'opt-in' to the open access data requirement.
It is the consortium's aim that the results of the project be disseminated as broadly and efficiently as possible. One such route to dissemination is through publications in peer-reviewed journals. Data sets supporting these publications will be made freely available in order to facilitate uptake by stakeholders and end users, and validation by other researchers.
The overall motivation for data collection in PHEMTRONICS is to facilitate knowledge dissemination. Therefore, PHEMTRONICS will make its research data Findable, Accessible, Interoperable and Reusable (FAIR) in order to ensure that it is soundly managed.
The selection of data to be openly accessible will be made on a case by case basis and agreed by the consortium. This will include ethical aspects and data security such as for the protection of IP for any project outputs that are considered to be commercially exploitable. In such cases, it may be necessary to withhold all or some of the data generated. This will be decided by the relevant partner(s) and managed by the Consortium Agreement and if appropriate the project's exploitation plan.

Figure 1 illustrates the main procedure used in the project to ensure open access to research data and publications.

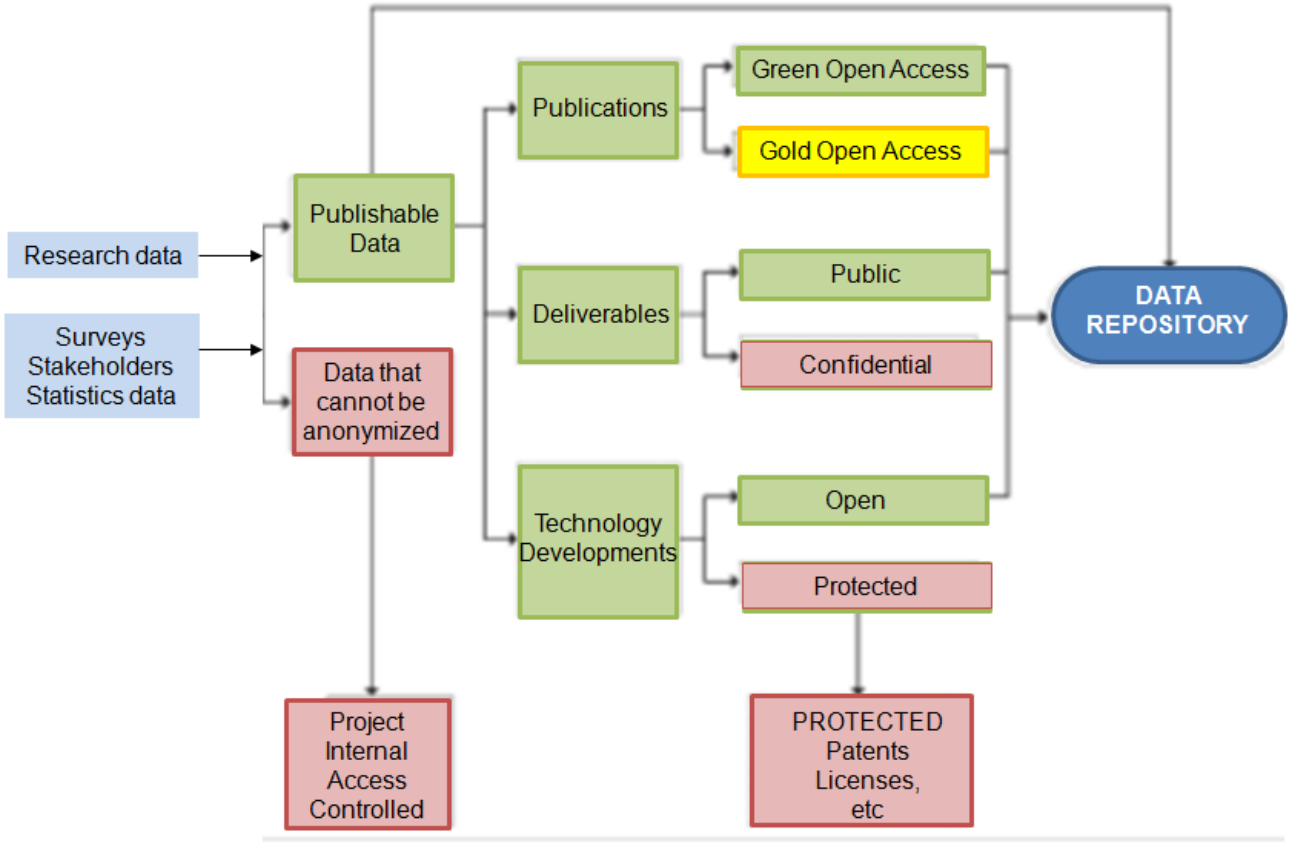

Figure 1: *PHEMTRONICS data management procedure*

2.2 Data Managers

The following partners will be responsible for

- Project management and coordination: CNR
- Data management plan: CNR
- Metadata / documentation – Data Controllers: All partners
- Data security / backup: All partners

For data preservation, internal repository or archive will be used. Each partner institute is responsible for storing their data obtained within the project in an institutional repository or archive.

During the lifetime of the project, partners might discover business opportunities based on the project's results that can lead to commercial exploitation. This will be monitored by the Exploitation Manager (VLC, Iñigo Artundo) and Market Innovation Manager (TE-OX, Guy Garry), and if cases arise appropriate steps to protect such results for exploitation purposes will be taken. As Figure 1 shows, data underlying such results will not be openly shared.

2.3 Data types and formats

The data that will be collected, processed or generated in PHEMTRONICS can be split into the following five categories:

1. **Contacts Information**:
   1A. Project partner representatives;
   1B. Project external individuals and stakeholders who voluntarily participate in project communication and dissemination activities;

Access will be restricted to the members of the consortium. Note that Advisory Board members are considered members of the consortium, yet with limited access

2. **Project files:** includes data on competitors, providers, literature data for benchmarking purposes, data gathered from meetings, workshops, and any type of internal communication. These will be protected according to each required level of confidentiality. State-of-the-art methods and public resources gathered from social networks or other platforms will be stored with reference to the corresponding organizations.
3. **Research collected data**: the search activities and their corresponding outcomes (deliverables, publications) are diverse and are detailed in Table 1. In general, scientific outcomes of the project will be disseminated without restriction, if no sensitive data are disclosed. In the case of confidential discussions or outcomes (e.g. EU Restricted deliverables), only specific partners will have access.
4. **Development data, databases and codes**. Development of databases and codes, as well as implementations derived from the project, will be performed in a private repository in the restricted area of the website. Periodic versioning backups will be made and stored in GoogleDrive.
5. **Data on Testing/Prototyping activities**. The information of the users involved, the pieces of synthetic evidence and the processed data will be stored and managed locally by each partner. In the case of an end user using their own repositories, their local policies and data management restrictions will apply.

The main data origins will be:

- Experimental work in consortium laboratories;
- Theoretical and modeling from consortium partners;
- Interviews with groups, stakeholders and individual participants;
- Feedback from participants at stakeholder workshops, roundtables;
- Survey responses;
- Market surveys;
- Literature study/review and open data (re-use of existing data);
- Data collected during our workshops and schools;
- Data collected by meetings with end-users.;

Those types of data to be collected and processed include either:

- No personal data: such information which is not affected by Data Protection legislation;
- Personal data: Data containing individual's sensitive information, according to the EU definitions.[3]

All personal data will be anonymized according to the guidelines derived from activities focused on ensuring the ethical and privacy issues and compliance with legislation.

2.4 Data formats

A dataset can include different types of formats. As an example, a research collected dataset can include images, videos in labs, and tables of data. A dataset concerning communication with general public, stakeholders, etc. can consist of both written interview notes, audio files from interviews, pictures, and survey responses.

PHEMTRONICS will only use widely accepted formats for data generation and data standards such as:

[3] https://ec.europa.eu/info/law/law-topic/data-protection/reform/what-personal-data_en

- Documents/Reports/Publications: PDF, doc/docx;
- Measurement data will be stored in ASCII format (raw data), XLSX or CSV (processed data); uncertainty calculations will either be stored in XLS or MSU files;
- Presentations will be stored in PPT or PDF files;
- Spreadsheets: .xls/.xslx, .DAT;
- Databases: .cvs;
- Audio files. .mp3, .wav, .wma, .ra;
- Pictures and Figures: .jpg, .png, .PDF, .ppt;
- Videos: .avi, .flv, .mov, .mp4, .wmv;

The following list describes the metadata that will be provided for each dataset:

- File name
- Date
- Version
- File type
- Description
- WP (Work Package) number
- Responsible person
- Leader partner
- Dissemination level

4. Datasets to be Generated and Collected

Table 1 provides a preliminary list of datasets currently expected to be generated in the PHEMTRONICS project and their planned accessibility. We recognize that this list will develop and grow as the project evolves.

Table 1: *Datasets expected for PHEMTRONICS project*

WP	Name of Dataset	Description	Format	Responsible	Type	Comment
1	Consortium Contacts	Contact information of project partners	.xls .pdf	CNR	CO	• Data shared among partners • Personal protected information
1,5	List of Events	Info & pictures of relevant events from the project and that the process will attend	.doc .ppt .jpg .xls .pdf	CNR, UCC	PU or CO	Data shared among partners Some made public
1,5	Mailing lists & Stakeholders	Contact information of main institutions, collaborators and stakeholders interacting with the Project	.xls .pdf	CNR, TEOX, VLC NANOM	CO	• Data shared among partners • Personal protected information
2,3	Electronic properties	First principle calculations on electronic structure (i.e. band diagram, density of states) and optical properties	.txt	UC	PU	Data shared via repository

2	Polarimetric properties	Mueller matrix and polar decomposition measured on the studied PCMs	.txt .pdf	UC	PU	Data shared via repository
2	Phonon Database	Raman spectra on the studied PCMs	.txt	CNR	PU	Data shared on repository
2	Structure Database	Phase Change materials structure (XRD, Raman, tc..) database	.pdf .dat	JKU	PU	Data shared on repository
2	Plasmonic Code	Plasmonic calculations (i.e. cross-sections, scattering diagrams, near-field enhancements) on nanostructures of the studied PCMS	.txt .pdf	UC	CO	Data shared among partners
3	Optical dataset	Optical response of the phase change device	.dat .pdf. .jpg	WWU	CO PU	Data shared among partners Data shared on repository
4	PIC design KIT	Photonic **Process Design Kit** (PDK). This PDK can provide photonic designers with a standard and lower-risk design environment, specific data, models and processes	.dat .pdf	VLC	CO PU	Data shared among partners Data shared on repository
4,5	Market Data	Trends on Markets of relevance for projects demonstrators	Pdf. Jpg.	TEOX	CO	Data shared among partners

5. Zenodo Repository

The strategy of the consortium is to publish all data relevant to the stakeholder in open access articles or in the electronic supplement thereof. In the case where additional data is available but cannot be published in the above-mentioned articles or corresponding supplements yet are of relevance to the stakeholders, they will be made available via a repository.

PHEMTRONICS will use the open research data repository *Zenodo* to comply with the H2020 Open Access Mandate.[4]

All scientific publications, including public deliverables and public parts of underlying datasets will be uploaded to the *H2020_PHEMTRONICS_Community*

https://zenodo.org/communities/h2020-phemtronics-community/

in addition to the *European Commission Funded Research (OpenAIRE) Community*[5] in Zenodo.

Zenodo[6] is a "catch-all" open research data repository which gathers research data across all disciplinary fields. It is for non-military purposes only, and the repository is hosted and managed by CERN. All data deposited to Zenodo is stored securely in the CERN Data Centre's cloud infrastructure.

[4] http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-pilot-guide_en.pdf
[5] https://zenodo.org/communities/ecfunded/?page=1&size=20
[6] https://zenodo.org/

6. FAIR Data Management

PHEMTRONICS will manage data in accordance with the principles of **FAIR data management** (Findable, Accessible, Interoperable and Re-usable data). The project aims to maximise access to, and re-use of research data generated by the project.

6.1 Making Data Findable, including provisions for metadata

6.1.1 The H2020 PHEMTRONICS Community in Zenodo

A *H2020PHEMTRONICS* community has been established on the Zenodo website, Collection URL: https://zenodo.org/communities/h2020-phemtronics-community/

The project is already uploading all our public datasets and deliverables as well as scientific publications to this community, as shown by Figure 2.

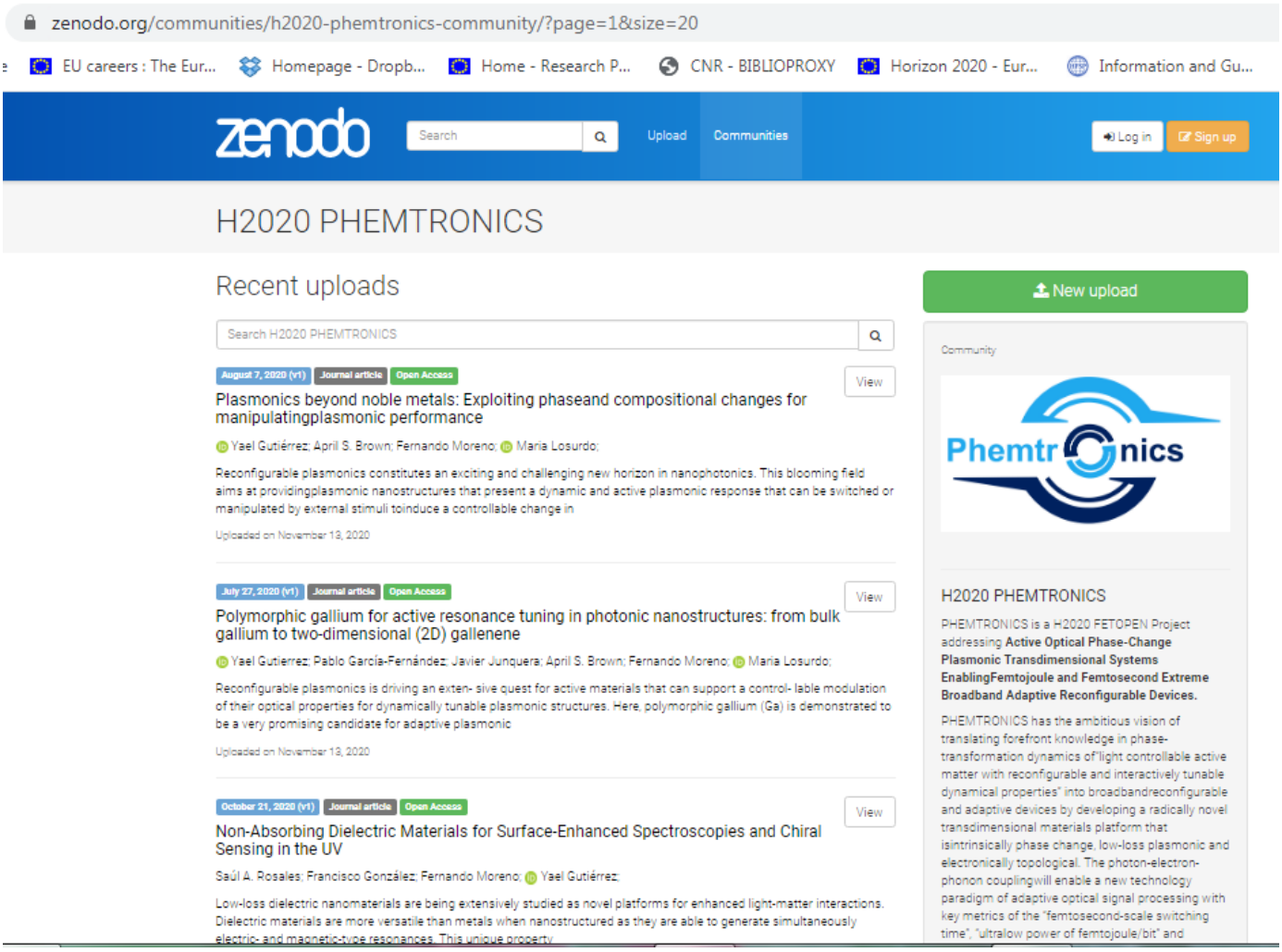

***Figure 2**: Screenshot of the Zenodo Community*

In addition, we have already linked all our uploads to the *European Commision Funded Research (OpenAIRE)* community for maximum findability. All uploads will be enriched with standard Zenodo metadata, including Grant Number and Project Acronym. Zenodo provides version control and assigns DOIs to all uploaded elements.

6.1.2 Metadata in Zenodo

Metadata associated with each published data set in Zenodo will by default be as follows:

- Digital Object Identifiers
- Bibliographic information
- Keywords
- Abstract/description
- Associated project and community
- Associated publications and reports
- Grant information with the project name and GA number
- Access and licensing info
- Language

As an example, the PHEMTRONICS Consortium has already made available as gold open access a set of data about the different phases of gallium. The screen shot of this ZENODO repository and connected with EC OpenAIRE is shown in Figure 3.

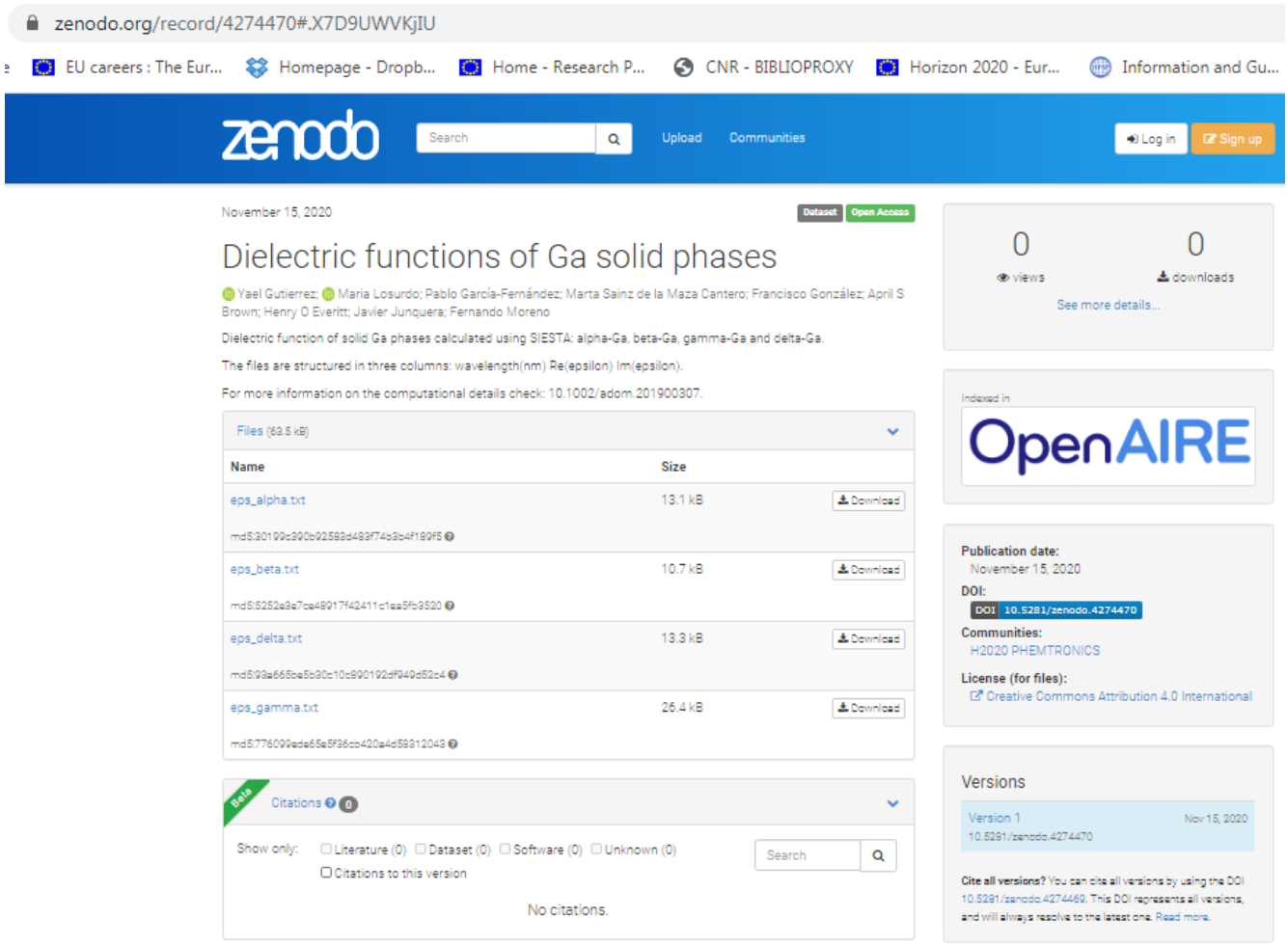

Figure 3 : *Screenshot of theZenodo and OpenAIRE repository where Phemtronics community is already making available optical data of the dielectric function of the various Gallium phases.*

6.1.3 Search keywords

The Data Controllers at each partner' site will be responsible for uploading public datasets that they have generated and to assign specific keywords relevant to these datasets. Dataset specific keywords must be descriptive to the content of the dataset. e.g., a dataset containing information *on phase change materials* should be tagged with corresponding keywords such as, "*PHASE*

CHANGE MATERIAL". In addition, PHEMTRONICS has defined a set of general keywords that should apply to all public datasets, scientific publications and public deliverables. These are as follow:

- Phase Change Materials
- 2D materials
- Chalcogenides
- Tunable Plasmonics
- Electromagnetic modeling
- DFT calculations
- Ellipsometry and polarimetry
- Hybrid integration
- Optical switches
- Reconfigurable devices
- Antennas
- Photodetecctors
- Reconfigurable PICs

6.1.4 Naming conventions

Datasets will be named using the following naming conventions:
DataCategory_DataController_Description_H2020_PHEMTRONICS_UniqueDataNr
Explanation of the naming convention:

- "DataCategoryNr" refers to the list of data categories described in Table 1:
- "DataController" refers to the short name of the partner/Data Controller who is responsible for the dataset.
- "Description" refers to a *short* description of the content of the dataset (see example)
- "UniqueDataNr" is the number automatically generated by the research metadata list.

Example of dataset name: *OpticalData_CNR_Refractive Index Profile_H2020_PHEMTRONICS_01*

6.2 SharePoint and metadata provision

All technical and scientific datasets will be stored in a SharePoint Folder of the protected area of the PHEMTRONICS project site. This will be the project's online collaboration platform during the project lifetime, and for up to 4 months after the end of the project for final closing activities. Data Controllers at each partner will be responsible for uploading their public datasets to SharePoint.

6.3 Making Data Openly Accessible: Open source and open access strategy

Openess in PHEMTRONICS is believed to be a major factor of innovation, and openess hs many facets for the project; the most significant are:

- **Open project collaboration.** A network will be established to collaborate with external partners, both other institutions and companies. All partners are committed to develop collaborative relationship with external partners for mutual benefit.
- **Open source technology.** From a technology prspective, the projects will share whener possible its outcomes with the community. Exploitation strategy, described in D5.2, is not based on locking down access to project results, but on providing added value through services. This also supports the open project collaboration with external partners and industry.
- **Open access to scientific results**. From a scientific perpective, the consortium clearly favours and adopts open access to its scientific outputs, which is also supported by all project members' policy of adopting open access.

The H2020 Open Access Mandate aims to make research data generated by H2020 projects accessible, but also accept protection of personal or sensitive data due to privacy concerns and/or commercial or security reasons.
All public datasets, scientific publications and deliverables will be uploaded to Zenodo and made openly available, free of charge. Publications and underlaying data sets will be linked through use of persistent identifiers (DOI versioning).
Data sets with dissemination level "confidential" will not be shared as of restriction due to protection for commercial exploitation. If such cases arise during the project, this will be informed in the final version of the data management plan (DMP).
The data will be available through www.zenodo.org, and hence accessible using any web browsing application.
The list of expected datasets in Table I constitutes the first version of dataset description and we recognise that it will develop and grow as the project evolves. An updated version of this list will be provided at the end of the project.
The publications resulting from the project will be mainly “gold open access” and also “green open access”. The publications will also be made available on the website as far as it does not infringe the publisher’s rights. Furthermore, PHEMTRONICS consortium will explicitly state in every publication that all the data will be available from the corresponding author on request (“accesible on demand”), upon discussion of the request with the consortium partners.

6.4 Making Data Interoperable

The raw data will most likely be in ASCII or TXT or similar so that it can be processes by standard software packages like ORIGIN, COMSOL, FDTD LUMERICAL, MATHEMATICA, MatLab, Excel, etc.
Microcopy images data will be images files (i.e. .jpeg, .tiff) suitable for use with image processing softwares.
Furthermore, Zenodo uses JSON schema as the internal representation of metadata and offers export to other formats such as MARCXML, BibTeX, CSL, DataCite and export to Mendeley. The data record metadata will utilise the vocabularies applied by Zenodo. For certain terms, these refer to open, external vocabularies, e.g.: license (Open Definition), funders (FundRef) and grants (OpenAIRE). Reference to any external metadata is done with a resolvable URL.
The data gathered through questionnaires, interviews, observational studies, focus groups, stakeholders’ meetings, etc. will be anonymised and will only be known by the research partners involved.

6.5 Reusable Data

The PHEMTRONICS project will enable third parties to access, exploit, reproduce and disseminate (free of charge for any user) all *public* data sets.

7. Preservation and Longevity of Data

7.1 Public data

For data published in scientific journals, the underlying data will be made available no later than by journal publication. The data will be linked to the publication.
Data associated with public deliverables will be shared once the deliverable has been approved and accepted by the EC.
For other public datasets not directly linked to a scientific publication or deliverable, such datasets will be made available upon assessment by the Consortium that it is ready for publishing, and in the final month of the project at the latest.

The public data will remain reusable via Zenodo for at least 10 years. This is currently the lifetime stated by the host laboratory CERN. In the event that Zenodo has to close their operations, they have provided a guarantee that they will migrate all content (including metadata) to other suitable repositories.

7.2 Confidential data

All confidential data will be deleted at the end of the project. In case permission is given by the party providing and owning the data, some confidential data will be kept for a maximum of 1 year after the contractual end date of the project. The additional 1 year is to keep the underlying datasets available to allow the completion of any scientific publications being prepared towards the end of the project.

Pictures and videos, taken with consent from voluntary participants, that are used for communication purposes will be kept for up to 3 years after the end of the project in order to comply with the EC contractual obligation to continue dissemination and exploitation activities after the project ends.

8. Allocation of Resources

All costs related to the data collection and processing are covered by the project budget with dedicated person months under WP1.

The cost of the repository is included in the cost of setting up the project web page and its intranet and is charged to coordinator. An extension for additional 3 years after the end of the project is considered by the coordinator to ensure this obligation.

Each partner has allocated budget to make the data accessible via open gold access publications.

9. Legal, Security, Privacy and Ethical Aspects

9.1 Legal aspects

The legal aspects that impact data sharing is described in section 2.1 *Legal framework*. The work in PHEMTRONICS will fully comply with the regulations set out in the GDPR. In addition, PHEMTRONICS complies with the principles of the European Charter for Researchers, the European Code of Conduct for Research Integrity, including ethical standards and guidelines, regardless country in which research is carried out.

Nothing in PHEMTRONICS shall be deemed to require a party to breach any mandatory statutory law under which the party is operating. This includes any national or European regulations, rules and norms regarding ethics in conducting research.

9.2 Commitment to ethical principles

There are no ethical issues regarding the technical aspects of the project.

However, all project partners are obliged by European and national law (GDPR) to protect personal data.

The coordinator and all partners of the PHEMTRONICS project follow ethical guidelines in its work. Important aspects with respect to this are:

- The ethical guidelines are based on the vision of using science and technology to create a better society and are reviewed continuously to ensure they stay up to date with developments in society and the challenges of today. They generally fall into these categories: research ethics, business ethics, and ethics in interpersonal relationships.
- **The Coordinator CNR** complies to ethical, deontological and juridical issues that fall within the scope of Research Integrity, as it is described in the scientific literature and the main

international Charters and Conventions, as well as in the "Guidelines for Research Integrity" produced by the CNR, approved on the 10 June 2015 and updated in 2019.

- All partners are expected to act in accordance with the ethical guidelines and principles. As coordinator of the PHEMTRONICS project, CNR will ensure that any ethical issues, which may arise, will be handled appropriately and in a transparent and fair manner.

9.3 Relevant regulations and scientific standards

With the goal to enhance and to foster the participation of European citizens to education and science communication, regardless of cultural, linguistic, or social background, PHEMTRONICS will make every effort to heed the rules for the protection of personal data as described in Directive 95/46/EC regarding the personal data collected during the activities of the project.
In addition, the consortium is following the following European Regulations and Guidelines:
EU Guidelines on Ethics: Protection: http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/ethics/h2020_hi_ethics-data-protection_en.pdf

H2020 Regulation of Establishment:
http://ec.europa.eu/research/participants/data/ref/h2020/legal_basis/fp/h202 0-eu-establact_en.pdf

Ethics and Data Protection:
http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/ethic s/h2020_hi_ethics-data-protection_en.pdf

9.4 Data protection and privacy

Data collection activities includes interviews, questionnaires, interviews, focus groups, surveys, market analysis, end-users analysis and competitors analysis and will be designed to maintain privacy. Personal data will not be requested unless this is absolutely necessary. Participation is voluntary. Participants will be given the possibility to decline and withdraw their participation at any time. Data will be stored and processed in anonymous forms so the identities for the participants will only be known by the research partners involved. Raw data like interviews protocols will be shared within the consortium partners. Reports based on the interviews and other data gathering methods will be based on aggregated information and comprise anonymous quotations.
PHEMTRONICS will also collect pictures and video for use in communication activities (website, newsletter, social media. Examples include:

- pictures/video of individuals posted on the project website along with biographical details;
- individual images published in a newsletter;
- pictures/video where people are incidentally included in an image or are not the focus (e.g. at a big conference/workshop).

When collecting individual data, pictures and video PHEMTRONICS will follow established guidance and best practice on collecting and processing such data to ensure that we adhere to the legal requirements. Under no circumstances will pictures containing personal information be publicly shared without the subject's explicit consent.
The participants will be given an information letter and a consent form (on paper or electronically) as described in APPENDIX A. The information letter will provide information about:

- The type of data that will be collected during the study.
- How the data will be collected (interview, automatic data collection, etc.)

- What the data will be used for. The information letter will explain the purpose of the project and the expected results. It will also be explained that no personally identifiable information will be published in any way.
- How the data collected will be handled. The information letter will explain that personal data will be treated in full confidentiality and will be registered and stored in a secure manner.
- Who will have access to the data. The information letter will state that data will be handled by a very limited number of authorised personnel and that confidentiality will be regulated by legal agreements.
- The rights of the participants. The information letter will state that participation is voluntary and that participants can withdraw from the study at any time without any obligation to explain their reasons for doing so.

The collected data will be stored on a password-protected area at the coordinator for the data collection analysis. The data will be used only within the PHEMTRONICS project.
At the end of the project, all personal data, audio and video files included, will be deleted.
No personal data will be stored after the end of the project.
Pictures and videos used for project communication activities, these will be kept for up to 3 years after the end of the project through the project website, newsletters, and social media.
If a party withdraws the consent to use this material (pictures, videos), it will be deleted without delay.

9.5 Managing contact information

Contact information to external parties will be totally curated and preserved by the Coordinator. Pre-existing contact lists that will be used for dissemination and communication purposes will not be shared within the project, but they will be managed according to GDPR by the owning partners. All project generated contact lists will be stored in the PHEMTRONICS project private area site. Access will be managed by CNR. Contact information will never be shared with third parties, and only the essential information needed will be kept and stored.

9.6 Security

A complete database backup is performed each week and stored for the whole project duration on a external hard drive by the coordinator.

10. Conclusions

Formal approval and release of this deliverable within the consortium constitutes a formal commitment by partners to adhere to the data management strategy and the procedures it defines.
When the deliverable is formally approved by the European Commission, this constitutes confirmation that the procedures are considered by the European Commission to be adequate.
As coordinator of the PHEMTRONICS project, CNR will ensure that any data management issues which may arise during the project will be handled appropriately and in a transparent and fair manner.
The present Data Management Plan is a living document that will expand as the project evolves and new information on data collection, generation and handling arise.
Day to day data management will happen through the online tools described in this document, and through continuous collaboration between the coordinator and the Data Controllers at each partner site.
A revised and extended version of this Data Management Plan will be prepared towards the end of the project to reflect the current status of data management in the project.

Appendix A

Active Optical Phase-Change Plasmonic Transdimensional Systems Enabling Femtojoule and Femtosecond Extreme Broadband Adaptive Reconfigurable Devices

Grant Agreement No: 899598

PHEMTRONICS Confidentiality agreement

The user study data shared between the PHEMTRONICS Consortium contains personal identifiable Information which usage is protected by law.
To apply to this law, usage and sharing is restricted and you should follow the rules and guidelines described in the ethical guidelines defined for PHEMTRONICS for collecting, processing, sharing and storage of data.
In addition to this you have to accept the following terms:

◯ I will not share the data received with any third parties.

◯ I will delete the data at least_____(recommended time is 3 months) months after the resulting studies have first been published.

.

Declaration on consent: I hereby declare my consent with the rules described above:

Date.....

Name.....

Organization.....

Signature.....

Appendix B

Active Optical Phase-Change Plasmonic Transdimensional Systems Enabling Femtojoule and Femtosecond Extreme Broadband Adaptive Reconfigurable Devices

Grant Agreement No: 899598

Data exchange form

As research partners in the PHEMTRONICS consortium we agree to share personal identifiable information of individuals and/or organizations as defined in the Confidentiality Agreement. This data exchange form documents the exchange between partners regarding sensitive data.

Researcher(s) responsible for the data (who collected the data originally)	
Type of data (e.g. interview recording, questionnaires, etc.)	
Sensitivity of data (describe briefly why this specific data is highly sensible)	
Storage location	
Person(s) who have access to the data	
Purpose of sharing	
Data retention (timeframe for storing the shared data)	

Date.....

Name.....

Organization.....

Signature.....

Appendix C

Active Optical Phase-Change Plasmonic Transdimensional Systems Enabling Femtojoule and Femtosecond Extreme Broadband Adaptive Reconfigurable Devices

Grant Agreement No: 899598

Information letter and Informed Consent form

This information letter provides information about the PHEMTRONICS project to persons and stakeholders who are asked to contribute and provide input to the project. It will give you information on the goals of the project and what participation will mean for you.

Project Goal

PHEMTRONICS has the ambitious vision of translating forefront knowledge in phase-transformation dynamics of "light controllable phase change materials" into broadband reconfigurable and adaptive devices.
To do so PHEMTRONICS will (i) develop a novel platform of eco-sustainable non-toxic phase-change transdimensional materials; (ii) pioneer a programmable mixed-mode plasmon-opto-electrical machine, actuated with novel active phase-change low-loss plasmonic nanoantennas; (iii) master beyond-equilibrium phase-transformations through predictive models to guide reconfigurability of devices.
PHEMTRONICS will deliver demonstrators of

- Ultrafast and low-power switches
- Adaptive antennas
- Adaptive switchable multiple-band detection which is the future generation of photodetectors
- All-optical spiking neuron circuit, with integrated all-optical synapses.

Who is responsible for the project?

CNR is a non-profit governmental research organization based in Italy and is the coordinator of the PHEMTRONICS project with the overall responsibility for its implementation. The PHEMTRONICS consortium has 8 organisation from around Europe, funded by the European Union's framework programme for research and innovation, Horizon 2020, under the Grant Agreement number 899598.

Why are you asked to participate?

To make the results from the PHEMTRONICS project useful and adoptable, user expectations and behaviours need to be understood. The project will collect feedback from stakeholders and users through interviews, workshops and questionnaires.
You receive this invitation because you are identified as a relevant stakeholder for the PHEMTRONICS project.

What does it mean for you to participation in the project?

The participants will be invited to participate through workshops, surveys/questionnaires and interviews, to provide input on needs, requirements and feedback for the project development, evaluation and exploitation.
In return, the participant will get first-hand knowledge about the project, on-site discussions with the PHEMTRONICS consortium and a dedicated distance coaching programme for the preparation of roadmaps for integration of PHEMTRONICS solutions.
The participants can choose to join one or more activities (interviews, focus groups and questionnaires):
Interview: An interview typically lasts between 15min and a half hour. Typically, two persons from the PHEMTRONICS project team will take part in the interview. Interviews may be conducted face-to-face or (if more convenient for participants) using teleconferencing.
Workshops: The workshops will take place online (webinar) or face-to-face in a meeting room, depending on the needs and availability of those attending. Participants will collaborate with partners from the PHEMTRONICS team to ensure and maximise end user applicability and acceptance. The duration of each workshop will be from a few hours up to two days.
Survey/questionnaire: The surveys/questionnaires will be both online forms sent to those who accept the invitation to participate, and paper forms handed out to main conferences and events to those who wish to participate. A survey/questionnaire will typically have between 5 and 20 questions for the participants to answer at their own convenience.

Appendix D

Active Optical Phase-Change Plasmonic Transdimensional Systems Enabling Femtojoule and Femtosecond Extreme Broadband Adaptive Reconfigurable Devices

Grant Agreement No: 899598

Horizon 2020 FETOPEN

PHEMTRONICS Statement of Consent

I have read and understood the details of the research as explained in the PHEMTRONICS information letter for participants and have been given the possibility to ask questions about the project and my participation.
I provide my consent to
☐ Participate in interviews
☐ Participate in workshops
☐ Participate in surveys and questionnaires
☐ My personal data can be stored for up to 4 months after the official end date of the project

☐ I agree to video recording
☐ I agree to photos being taken

I confirm that I consent to participate in the study and that my participation is entirely voluntary.

_____

Participant name & signature, place, date