DATA MANAGEMENT PLAN

# 1. Data description and collection or re-use of existing data

## How will new data be collected or produced and/or how will existing data be re-used?

Within the scope of the project multiple types of qualitative and quantitative data will be generated. It will be related to electrochemical, electronic, mechanical and physico-chemical measurements, SEM/AFM/TEM micrographs, grafting designs and technology procedures. Raw data will be analyzed and expressed as graphs, tables and annotated images, some of which are expected to be published. Raw data will be stored in an organized manner by all research team members and sufficient care will be taken to prevent any data loss. In essence, all data processed in this project will be generated by the research activities of the team members within the scope of activities planned and described in the research plan.

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## What data (for example the types, formats, and volumes) will be collected or produced?

Data generated will be in various formats and sizes of databases, most of which will be accessible using common software allowing easy access and long-term validity during and after the project, thus facilitating data sharing. The exception will be the DEIS data, which will be processed (Fourier transformed) and saved as txt files. Micrographs in .jpg or .tiff format. The size of a single data set depends on the measurement approach and is typically 30 MB. Around 500 various images are expected to be taken within the proposed project.

# 2. Documentation and data quality

## What metadata and documentation (for example methodology or data collection and way of organising data) will accompany data?

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Most data will be collected in a highly automated manner by the equipment which in some cases will include additional metadata. Data files will be labeled appropriately and placed in clearly labeled folders. Gdańsk Tech operates a dedicated system, MOST Wiedzy Open Research Data Catalogue which is a platform that allows collecting, searching, analyzing and sharing open research data. These data will be made available free of charge to the scientific community, entrepreneurs and the public. The available research data will be described by standards developed by dedicated, experienced scientific teams. The metadata will allow other external computer systems to interpret the collected data. ORD descriptions will also include data reuse or reduction scenarios to facilitate further processing. Selected data generated within the project will be disseminated with appropriate metadata standards e.g. DataCite, DDI. Metadata description will be stored in JSON-LD format. Contributor will be identified and authorized by ORCID.

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## What data quality control measures will be used?

Standard protocols will be optimized and used to collect data to ensure reliability and consistency. All experiments will incorporate appropriate positive and negative controls to ensure validity. Whenever possible experimental setups involving internal controls will be preferred. Project staff will be trained in techniques they use to ensure quality data. Data will be discussed in weekly lab meetings to ensure correct procedures. Data will be cataloged in a way to fulfill FAIR standards requirements.

# 3. Storage and backup during the research process

## How will data and metadata be stored and backed up during the research process?

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All the data will be obtained in laboratory conditions, without risk of their loss. All experimental details and data will be recorded, dated in laboratory notebooks and discussed at lab meetings. Data will be kept at secured hard drives and/or Gdańsk Tech and on-line cloud availaible for all members of the research team. Selected data sets will be stored in a dedicated repository, MOST Wiedzy Open Research Data Catalogue (described in detail in 2.1), which also serves as a form of reliable backup, including the metadata. The Principal Investigator will be responsible for the enforcement of the data management plan.

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## How will data security and protection of sensitive data be taken care of during the research?

No medical, personal or otherwise sensitive data is expected to be generated during the proposed project. Data recovery will be possible thanks to backup procedures. Data storage will be kept in accordance with the policy of the Gdańsk Tech, preventing access without the authorization.

# 4. Legal requirements, codes of conduct

## If personal data are processed, how will compliance with legislation on personal data and on data security be ensured?

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Intellectual property for any results generated within the project are regulated by the suitable local rules approved at the Gdańsk Tech. Any background IPR will be respected. Any rights belonging to the authors will be shared according to their fair contribution within the scope of the project or on equal rights whenever possible. Whenever possible, dissemination of the deliverables of the project with be carried out using open-access channels, e.g. under Creative Commons licenses.

How will other legal issues, such as intellectual property rights and ownership, be managed? What legislation is applicable?

The ownership and management of any intellectual property relating to the Project remain in the rights of the Gdansk University of Technology and the research team members accordingly to the Polish law and institutional regulations (Resolution of the Senate of the Gdańsk University of Technology No. 117/2021/XXV of 19 May 2021 https://link.pg.edu.pl/GdańskTech\_intprop).

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## How will other legal issues, such as intelectual property rights and ownership, be managed? What legislation is applicable?

# 5. Data sharing and long-term preservation

## How and when will data be shared? Are there possible restrictions to data sharing or embargo reasons?

## How will data for preservation be selected, and where will data be preserved long-term (for example a data repository or archive)?

The data will be stored in a dedicated MOST Wiedzy Open Research Data Catalogue (described in detail in 2.1) repository, that is free of charge for all users. The end time of data preservation is not specified but it will be minimum 10 years There are no regulations regarding data destruction. Data provided in the repository will fulfill FAIR requirements (Findable, Accessible, Interoperable, Reusable), and will be categorized and labeled according to standard file formats. Data carried out under flawed measurement conditions will not be preserved.

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Selected data will be uploaded as soon as possible (not later than after acceptance of the manuscript for publication) and kept at open repository MOST Wiedzy Open Research Data Catalog. There are no restrictions regarding data sharing and no sensitive data will be published. Majority of scientific journals do not require the direct sharing of raw data. However, selected datasets published in a processed way in scientific journals, will be preserved according to the rules imposed by the specific journal (e.g. for 2 or 5 years).

## What methods or software tools will be needed to access and use the data?

Most of the data will be produced in standard ASCII formats and will require no further transformation. Data will be stored using the dedicated repository MOST Wiedzy Open Research Data Catalogue.

## How will the application of a unique and persistent identifier (such us a Digital Object Identifier (DOI)) to each data set be ensured?

The MOST Wiedzy Open Research Data Catalogue repository (described in detail in 2.1) supports obtaining unique DOI numbers for each of the uploaded datasets. Data stored within this project will be linked with such unique DOI numbers.

Data management responsibilities and resources

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Who (for example role, position, and institution) will be responsible for data mangement (i.e the data steward)?

Open Science Competence Centre which is a constituent part of the Gdańsk Tech will be responsible for data management pla and quality of metadata created for datasets in the MOST Wiedzy repository. Project PI will be responsible for the procedures of assessment and overall data quality.

What resources (for example financial and time) will be dedicated to data management and ensuring the data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?

No specific allocation within the project for FAIR enforcement is planned. This is because the Gdańsk Tech already operates a platform, the MOST Wiedzy Open Research Data Catalog (described in detail in 2.1) already implements these requirements. As the platform is available free to the employees of the Gdańsk Tech, it will be utilized at no additional cost. Special care will be taken to ensure that all data that is to be disseminated via this platform is checked for integrity and errors. This process will be the responsibility of each of the researchers. In general, an average of 10% of the time within the project will be dedicated to preparation of data summaries, presentations and data integrity checks.

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# 6. Data management responsibilities and resources

## Who (for example role, position, and institution) will be responsible for data management (i.e the data steward)?

## What resources (for example financial and time) will be dedicated to data management and ensuring the data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?