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?

New data will be acquired by cyclic voltammetry (CV) and Dynamic Electrochemical Impedance Spectroscopy (DEIS)

measurements conducted on polished platinum electrode after multi-step cleaning and stabilisation of its potential in

an electrochemical system. Data determination from DEIS measurements will be carried out using an application

prepared in LabView, then saved in text documents (.txt), and read in by code developed in Python.

Solutions will be prepared using water of grade I purity according to EN 3696:1999 and chemical reagents of the

highest possible purity. CV measurements will verify the purity of the system prior to DEIS measurement. A

measurement will be considered valid when a CV curve consistent with the literature for the solution is obtained. At

least 3 repeated measurements will be collected for each solution.

Files will be stored in labeled folders separate for each solution, concentration and temperature as well as

measurement repetition.

[w języku angielskim]

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

For each measurement repetition, 7 text documents (.txt) with a total size of approx. 9 MB will be obtained, containing

the values of current, potential, real and imaginary part of the electrode impedance and the so-called “frequency

package”. The measurement results will be plotted on spectrograms and spectra of impedance, capacitance and

charge, as well as associated graphs in .JPG format. The quantities determined in the analysis of the raw results (real

and imaginary part of capacitance and charge as a function of electrode potential, equivalent circuit parameters) will

be saved as text documents (.txt) or as CSV files (.CSV). Text studies will be prepared in .docx or .pdf documents.

The estimated total size of all files will be 0.5-2GB, depending on the required measurement repetitions and the

number of created graphs.

# 2. Documentation and data quality

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

The files will be stored in folders with names describing the type and concentration of electrolyte, divided into internal

folders describing the temperature of the solution, and further internal folders labelled with numbers representing the

measurement repetition number and information regarding deoxygenation of the solution. An explanation of the data

description and additional information on the measurement conditions (e.g. electrode surface area, measurement

technique and parameters) will be included in the README file, which will be provided with the measurement data.

The raw measurement data and the data resulting from the conducted analyses can be read out using a computer with

standard MS software and/or Adobe Reader software, and no dedicated software is required to read and reuse the

data. However, interpretation of the results requires knowledge of impedance techniques and oxygen electrochemistry

on platinum.

## What data quality control measures will be used?

Minimising data validity risks will be realised by providing measurement conditions of the highest possible purity

through the use of high purity water and reagents and multi-step cleaning of the electrode surface.

Quality evaluation is implemented by performing a CV measurement prior to the DEIS measurement, which verifies

purity of the system, and by monitoring the spectra shape during DEIS measurement. At least three measurement

repetitions will be performed for each solution to eliminate measurement errors.

The problem of bias will be addressed by documenting the procedure for preparing the solutions and sample for

measurement as well as documenting the CV and DEIS measurement parameters, to enable reproduction of the

measurements by other researchers.

# 3. Storage and backup during the research process

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

Data will be stored according to the 3-2-1 rule. Copies of all data will be stored on the project manager's computer with

a storage capacity of 237GB, on an external drive with a storage capacity of 2TB and in the university's OneDrive cloud

with a storage capacity of 100GB, so that both members of the project will have access to the data, but only after

logging in to the university system. Data on the computer and drive will be protected through the passwords. The data

on the computer and external drive will be copied as soon as the measurements are taken, while the data to the

university cloud will be copied every month. Project manager is responsible for creating backups.

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

Project members will have access to the measurement data during the project, and coporrespondence related to the

project will be carried out using work email. The project subjects are not expected to obtain sensitive data. If such data

is obtained, it will be encrypted and stored in locked metal cabinets. In accordance with the Gdańsk Tech data security

policy, personal data in paper form will be securely stored in locked file cabinets. Personal data and sensitive data in

electronic form will be stored on workplace computers in an encrypted format, password protected for computer and

document access, while computers are protected with anti-virus software. Only authorised persons may process

personal data.

# 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?

The project subject matter does not involve the collection and processing of personal data. If such data will be

collected in order to comply with Polish RODO regulations, participants will be informed about the existing privacy

policy and about the administrator of their personal data. Participants' consent will be obtained for recording and

sharing their personal data. If necessary, the data will be anonymised or pseudonymised to preserve confidentiality.

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

przepisy

Researchers will contribute through collaborative agreements, but in accordance with the Regulations concerning

management of copyright, related rights, industrial design rights and principles of commercialization (Resolution of the

Gdańsk Tech Senate No. 117/2021/XXV of May 19, 2021), Gdansk Tech university will retain ownership of the

intellectual property rights. The CC BY/CC BY-SA licenses will be used or as requested in the data sharing application,

ensuring appropriate acknowledgement of authorship and attribution.

# 5. Data sharing and long-term preservation

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

Raw data in .txt format will be published no later than the publication of the scientific article in the MOST Wiedzy Open

Research Data Catalogue under a CC BY 4.0 license. The embargo duration will be in line with the requirements of the

journal, but will be no longer than 36 months, and the embargo will be lifted as soon as the article is published. Data

not stored in the repository will be retained for 10 years. Access to the data may be delayed to protect intellectual

property, but once any restrictions are removed, the data will be made openly available.

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

Only data containing valid measurement results will be designated for storage in the Gdańsk Tech University repository

- MOST Wiedzy Open Research Data Catalogue, which fulfils the principles of FAIR Data, making the data findable,

accessible, interoperable and reusable for other researchers and will be accessible for a long time.

All research data, including unpublished data, will be stored for min. 10 years in the research data archive of the user in

the OneDrive cloud installed as a disk in the computer by an employee of the Gdańsk Tech IT Centre. Both the release

of data in the repository and the storage in the OneDrive cloud are free of charge.

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

Measurement data will be saved and stored as text documents (.txt), which does not require access to special software

to read them. The data will be made available in the MOST Wiedzy Open Research Data Catalogue, and its structure

will be explained in an additional README file. Data in the repository will be shared in formats accessible in the Open

Source software. If the project produces data that requires specific software to read, this information, along with a

description of the procedure for reading the data, will also be included in the README file. However, interpretation of

the results requires specialised knowledge of the used measurement techniques and the investigated research area.

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

To ensure accurate and efficient data localisation, a DOI (Digital Object Identifier) will be permanently assigned to each

dataset.

# 6. Data management responsibilities and resources

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

The project manager will be responsible for the substantive value of the data published in the MOST Wiedzy Open

Research Data Catalogue, the quality of the data and the timing of its release. The staff of the Gdańsk Tech Library

Open Science Competence Center and Gdańsk Navigation IT Services Center will be involved in ensuring that the data is

properly stored, documented, made available and that the intellectual property rights of the research data and the

licences under which the data can be published are defined.

## 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)?

Both data storage in the MOST Wiedzy Open Research Data Catalogue and data storage on OneDrive (up to 100GB)

cloud is free. Appropriate staff hours, software and storage space will be provided to ensure that all FAIR principles are

fulfilled. If additional costs are generated they will be covered from indirect costs of the project.Anna Karólkowska, Politechnika Gdańska 647441