# BioInter DATA MANAGEMENT PLAN

## ADMIN DETAILS

**Project Name:** Bio-inspired design of fibre interfaces with intermittent weak and strong areas for obtaining tough composites

**Grant number:** G0D5323N

**Principal Investigator / Researcher:** Yentl Swolfs

**Project Data Contact:** Yentl Swolfs

**Abstract:** One of the most ambitious goals in structural materials is to achieve exceptional mechanical properties with an ideal combination of lightweight, high strength, and high toughness. For many biomaterials, strategies to achieve the advantageous unification between structure and mechanical properties have been through millions of years of evolution, as in the case of nacre, one good example of a material that combines high strength, high stiffness, and high toughness.

Inspired by nature strategies to increase toughness, BioInter proposes to engineer the interface of composites by creating alternate sections around the fibre and along the fibre length of high and low adhesion with the matrix using micro-plasma surface deposition and activation, promoting intermittent sections of high and low shear strength during the process of debonding. The strong regions ensure that the filament strength is taken, while the weak areas weaken the running crack, creating a complex pattern for crack evolution.

**Institution:** KU Leuven

## 1. GENERAL INFORMATION

**Name applicant:** Yentl Swolfs

**FWO Project Number & Title:** G0D5323N, Bio-inspired design of fibre interfaces with intermittent weak and strong areas for obtaining tough composites

## 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).**

| Type of data | Format | Volume | How created |
|---|---|---|---|
| Optical and scanning electron microscopy images | .tiff | 10 GB | Taken using an optical microscope or scanning electron microscope |
| Abaqus simulation files | .inp, .odb, .cae | 4 TB | Processed with Avizo |

| | | | |
|---|---|---|---|
| - Simulation trajectories<br>- Analysis and post-processed results | .gro, .xtc, .trr, .pdb, .m, .py , .xyz | 50 TB | From MD solvers like LAMMPS and Gromacs |

## 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)**

- Yes

Carbon fibres are dual-use items. The KU Leuven “Ethics Committee on Dual Use, Military use & Misuse of Research” sets out three questions:

- Does the research have a military finality?
- Is the research part of a sensitive call?
- Is there a sensitive partner, funding body, end use(r) due to the project content?

The answer to all three questions is clearly no for this project, which implies that we do not to apply for explicit approval of the committee.

**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. For the optical images: camera details, magnification, sample dimension

2. For the scanning electron images: SEM details, voltage, current, magnification, sample dimensions, coating details
3. For the Abaqus simulation files: The Abaqus and Python scripts will contain comments about specific features implemented in the models. The .inp and .cae files store all input information in terms of material properties, behaviours and geometric features of the model, so this can easily be traced back afterwards. Together with the Python scripts, this provides enough information to enable the reuse of the models.
4. For the molecular dynamics simulations: The LAMMPS and Gromacs input files, e.g. data (topology) and input script (simulation parameters) files, as well as Python and MATLAB scripts to process the XYZ dump files generated by the MD solvers.

**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.**

- Yes

For the optical images, manual metadata will be created including the data mentioned above. For the scanning electron microscopy images, this data is automatically created.
For the CSV and TIFF data, the ISA-Tab standard, developed at the University of Oxford, will be followed.

## 5. DATA STORAGE AND BACKUP DURING THE FWO PROJECT

**Where will the data be stored?**
All the data will be stored on the hard drives of the researchers involved in this project, and the smaller files will be stored on OneDrive.

**How is backup of the data provided?**
The researchers will regularly backup their data on our NAS system.

**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

We have enough space on our NAS for the mentioned data. We will buy one hard drive per researcher to enable easy access to the data.

**What are the expected costs for data storage and back up during the project? How will these costs be covered?**
We will buy 2 external hard drives. Our NAS still has enough storage capacity at the moment, so we only need minor further investment if one of the current hard drives fails.

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

Our data is not highly sensitive. The data on our NAS and hard drives are encrypted, and access to our NAS is limited to a few people in the group. The selected data on OneDrive is only accessible to the researchers themselves.

## 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, ...).**
The data will be retained for 5 years after the end of the project. When the researchers eventually leave KU Leuven, the responsibility will be transferred to Prof. Yentl Swolfs.

**Where will the data be archived (= stored for the longer term)?**
On the NAS and the external HDDs.

**What are the expected costs for data preservation during the retention period of 5 years? How will the costs be covered?**
Since the selected data will be stored locally on two different storages, there are no extra costs associated with it.

## 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?**
The full datasets may be too large to make all of them publicly available. However, we will make the most useful images and model data available through supplementary information, a Data-in-Brief article or Mendeley Data.

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

- In an Open Access repository

We already regularly publish datasets on Mendeley Data with an accompanying Data in Brief Journal paper. We will do the same for the current project.

**When will the data be made available?**

- Upon publication of the research results

We will make the data publicly available as soon as the results are submitted for publication.

**Who will be able to access the data and under what conditions?**
Both Mendeley Data and Data in Brief articles are open access. Therefore, the data will be accessible to the public.

**What are the expected costs for data sharing? How will the costs be covered?**
Mendeley Data provides 10 GB of free space, which I believe is enough for the selected data for public access. Data in Brief publication has a cost of 700 USD, which will be paid from the project bench fee.

## 8. RESPONSIBILITIES

**Who will be responsible for data documentation & metadata?**
The researchers Ali Khodayari and Sina AhmadvashAghbash

**Who will be responsible for data storage & back up during the project?**
The researchers Ali Khodayari and Sina AhmadvashAghbash

**Who will be responsible for ensuring data preservation and reuse ?**
Yentl Swolfs

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