DMP FWO 1S31022N

Project Name Femtosecond laser machining and injection moulding for the cost effective production of thermoplastic hollow microneedles - DMP FWO 1S31022N

Grant Title 1S31022N

Principal Investigator / Researcher Pol Vanwersch

Description Fabrication of thermoplastic hollow microneedles with injection moulding and femtosecond laser machining: study and modelling of the manufacturing processes.

Institution KU Leuven

1. General Information

Name applicant

Pol Vanwersch

FWO Project Number & Title

1S31022N - Femtosecond laser machining and injection moulding for the cost effective production of thermoplastic hollow microneedles

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).

Number (WP.X)	Type of data	Format	Volume	How created
1.1	Microscopy images	.tif, .jpeg	1 GB	Digital microscopy images of lasered samples
1.2	µCT images	.tiff	300 GB	Reconstructed slices of lasered samples
1.3	Python code	.py	10 MB	Self made interface for laser model
1.4	C code	.c	10 MB	Self made code for calculations of laser model
1.5	Simulation results	.html	1 GB	Surface plots of simulation results
1.6	Numerical data	.xlsx	5 MB	Summary file with measurements on µCT slices and simulation results
1.7	Confocal microscopy results	.plux, .pdf	5 GB	Confocal microscopy results of the lasered samples
2.1	Simulation results	.m3j	2 GB	Moldex3D simulation results
2.2	Simulation settings	.xlsx	10 MB	Summary file with the simulation settings corresponding to the simulation results

2.3	Mesh files	.ans	10 GB	Moldex3D mesh files
2.4	µCT images	.tiff	50 GB	Reconstructed slices of hollow microneedle cavities in mould inserts
2.5	Microscopy images	.tiff	10 GB	Digital microscopy images of polymer microneedles
2.6	Numerical data	.xlsx	10 MB	Summary file with measurements on µCT slices and microscopy images
3.1	CAD files	.stp, .prt	1 GB	CAD files of the hollow microneedles
3.2	Simulation results	.wbpj	100 MB	Ansys mechanical simulation results
3.3	Simulation settings	.xlsx	10 MB	Summary file with the simulation settings corresponding to the simulation results
3.3	Microscopy images	.tiff	1 GB	Digital microscopy images of the microneedles and skin model after the penetration tests
3.4	Numerical data	.xlsx	1 GB	Force-displacement measurements during penetration tests
3.5	Numerical data	.xlsx	10 MB	Summary file with measurements of penetration force, penetration depth and simulation results for penetration tests
4.1	CAD files	.stp, .prt	1 GB	CAD files of the mould design
4.2	Microscopy images	.tiff	1 GB	Digital microscopy images of the microneedle arrays
5.1	Powerpoint presentations	.pptx	5 GB	Powerpoint presentations for dissemination of the results in conferences and meetings
5.2	Manuscripts	.docx, .pdf	5 GB	Manuscripts for publications in journals and conference proceedings

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

Privacy Registry Reference:
Short description of the kind of personal data that will be used:

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

The developed models will be published along with the results. However, the python and C codes for the laser ablation simulations will remain within KU Leuven and can be used for providing services to other research groups or companies.

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?

Number	Description
1.1	Microscopy images are given a name which is associated with a set of parameters described in the experimental plan (.docx file describing the experiments performed). A scale is added on the images.
1.2	µCT images are saved with the corresponding .pca file, which contains all the necessary metadata about the settings used to take the µCT scans. The images are saved per scan in a separate folder, of which the name is associated with a set of parameters described in the experimental plan (.docx file mentioned in 1.1).
1.3	The python code is accompanied by documentation in comment form describing the actions performed by every block of code. Every new version of the python code is saved separately and ordered by date (naming starts with modification date). Every version is accompanied by a readMe file which states what is changed in the new version compared with the previous version.
1.4	The C code is the translation of the latest version of the python code, and is documented with comments describing the actions performed by every block of code.
1.5	The simulation results are given a name which gives the important settings used for the simulation. The simulation results are stored together with a copy of the code used to generate them
1.6	The Excel file uses named tabs, columns and rows to ensure its readability without extra metadata. The formulas are open and active, which means that readers can easily find out how raw data is being processed.
1.7	The plux files from the confocal microscopy measurements include the metadata about the measurements. The name of the plux files refer to sets of parameters described in the experimental plan (.docx file describing the experiments performed). The postprocessing steps are saved in pdf files with identical names.

2.1, 2.2	The Moldex simulation results will be given a name which will be referenced in the simulation settings xlsx file. In that excel file, the settings and metadata concerning the simulation results will be stored, along with the name of the mesh file used for the simulation.
2.3	The mesh files will be given a self-explanatory name. If multiple variations of meshing are used, readMe files will be added with more information on the mesh characteristics.
2.4	idem 1.2
2.5	idem 1.1
2.6	idem 1.6
3.1	The CAD files of the microneedles will be given a name which will be associated with a set of geometrical parameters in a .xlsx file stored in the overarching folder.
3.2	The simulation results of the penetration tests will be given a name which will be referenced in the simulation settings xlsx file. In that excel file, the settings and metadata concerning the simulation results will be stored.
3.3	idem 3.2
3.4	idem 1.1
3.5	idem 1.6
3.6	idem 1.6
4.1	The CAD files of the microneedles will be given a name which will be associated with a design approach. The files will also be classified by date (naming starts with modification date, then approach). Every version will be accompanied by a readMe file describing the design approach and particularities of the CAD file.
4.2	Microscopy images are given a name which is associated with a CAD file. A scale is added on the images.
5.1	The Powerpoint presentations will be stored by categories (meetings, presentations, conferences). The files will also be classified by date (naming starts with modification date)
5.2	The manuscripts will be stored in separate folders, along with a copy of the raw and processed data used for the manuscript. This will ensure that the reader will have no trouble finding the data files associated with the manuscript

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

No metadata standard will be used, but the data will be stored in a clear and comprehensive hierarchical folder structure. The names of folders and files will be self-explanatory. When clarity cannot be provided by naming, readMe files will be added. Microscopy images will always be saved with a scale and relevant naming to reduce the need for additional metadata.

5. Data storage and backup during the FWO project

Where will the data be stored?

The data will be stored mainly on OneDrive. This tool allows for automatic backup and version management, while giving the researcher the opportunity to make copies of the data on any hardware and work offline.

For data sharing and extra backup within KU Leuven, relevant information will be uploaded on the central servers available through a VPN. This will only be updated at key moments (publication of manuscript or yearly basis).

How is backup of the data provided?

The day-to-day changes will be backed-up on OneDrive.

Yearly back-ups will be done on KU Leuven central servers (personal server), with a copy of the relevant data (mostly dissemination) on the shared servers.

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

There is 2 TB available on OneDrive, which will be enough for this project.

Also, there is 100 GB available on the central servers, which can be expanded on demand.

What are the expected costs for data storage and back up during the project? How will these costs be covered?

There are no expected costs, since the 2 TB on OneDrive are provided by KU Leuven.

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

The data will be shared only with the relevant people, and modification by other people will be allowed solely through personal invitation by email for the relevant files only. There is no sensitive personal data which requires extra safety measures.

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 data and metadata will be saved.

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

The data will be stored on the KU Leuven central server at the end of this project, and full access will be given to the supervisor of the project: prof. Sylvie Castagne.

What are the expected costs for data preservation during the retention period of 5 years? How will the costs be covered?

No cost will be linked to the storage of data on the university servers.

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?

All data will be made available, except from the python and c codes for the laser ablation simulations. These will remain property of KU Leuven.

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

- Upon request by mail

When will the data be made available?

- Immediately after the end of the project

Who will be able to access the data and under what conditions?

The data will be available to everyone upon request by mail. Reuse will be allowed, provided that they give appropriate credit to the creators.

What are the expected costs for data sharing? How will the costs be covered?
No cost is expected for data sharing

8. Responsibilities

Who will be responsible for data documentation & metadata?
Pol Vanwersch

Who will be responsible for data storage & back up during the project?
Pol Vanwersch

Who will be responsible for ensuring data preservation and reuse ?
Pol Vanwersch during the project
Sylvie Castagne after the project

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