
Plan Overview

A Data Management Plan created using DMPOnline.be

Title: A Novel Micromanufacturing Process Chain for High Pressure and High Temperature Microfluidic Platforms

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Template: KU Leuven BOF-IOF

Project abstract:

High pressure and high temperature microfluidic applications alongwith highly abrasive loads require fabrication of micro-features such as micro-channels (straight and curved) with high degree of precision as well as high surface quality on difficult-to-cut materials such as STAVAX mould steel, Inconel IN718, and Niobium Carbide (NbC). These microfluidic applications have a huge application potential in several fields such as microfluidic channels for abrasive water jet cutting, liquid chromatography, carbon nanotube reactors, nanoparticle synthesis, micro-moulds for ceramic injection moulding, etc. Traditional microfluidic chips are made in PMMA or glass which are not meeting the functional requirements for these applications. This project therefore brings in expertise from KU Leuven and University of Ljubljana to develop a novel micromanufacturing process chain for fabrication of high pressure and high temperature microfluidic channels on difficult-to-cut materials. The process chain will involve investigations on athermal processes such as electrochemical micromachining, hybrid laser electrochemical micromachining, and plasma electrolytic polishing. It also includes a comparative study regarding microfluidic devices fabricated using micro-additive manufacturing. Together with an investigation of the dependence of these processes on the material microstructure at grain level, this will lead to a highly precise and athermal micromachining technology for fabricating high pressure, wear resistant and high temperature microfluidics. This CELSA project will therefore help in raising the TRL level of this technology up to TRL 4 making it highly promising for European projects under 'Made in Europe' and 'Manufacturing as a service to critical sectors' calls.

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A Novel Micromanufacturing Process Chain for High Pressure and High Temperature Microfluidic Platforms

Research Data Summary

List and describe all datasets or research materials that you plan to generate/collect or reuse during your research project. For each dataset or data type (observational, experimental etc.), provide a short name & description (sufficient for yourself to know what data it is about), indicate whether the data are newly generated/collected or reused, digital or physical, also indicate the type of the data (the kind of content), its technical format (file extension), and an estimate of the upper limit of the volume of the data.

Dataset name / ID	Description	New or reuse	Digital or Physical data	Data Type	File format	Data volume	Physical volume
		<i>Indicate: N(ew data) or E(xisting data)</i>	<i>Indicate: D(igital) or P(hysical)</i>	<i>Indicate: Audiovisual Images Sound Numerical Textual Model Software Other (specify)</i>		<i>Indicate: <1GB <100GB <1TB <5TB >5TB NA</i>	
Machining-CELSA	Experimental parameter data and the machining response during ECM of STAVAX steel, Inconel and NbC	N	D	N		< 1 GB	
Measurement-CELSA	Surface roughness measurement data of microchannels	N	D	N		< 1 GB	
Microscopy-CELSA	Micrographs of SEM and EDX generated from characterisation machined workpieces	N	D	I		< 100 GB	
Current_pulses-CELSA	Current pulse data (.csv) acquired from micromachining experiments	N	D	N		< 1 GB	
Images-CELSA	Photographs captured during experiments	N	D	I		< 1 GB	
Videos-CELSA	Videos captured during experiments	N	D	A		< 100 GB	

If you reuse existing data, please specify the source, preferably by using a persistent identifier (e.g. DOI, Handle, URL etc.) per dataset or data type:

NA

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, refer to specific datasets or data types when appropriate and provide the relevant ethical approval number.

- No

NA

Will you process personal data? If so, please refer to specific datasets or data types when appropriate and provide the KU Leuven or UZ Leuven privacy register number (G or S number).

- No

NA

Does your work have potential for commercial valorization (e.g. tech transfer, for example spin-offs, commercial exploitation, ...)? If so, please comment per dataset or data type where appropriate.

- Yes

Yes, the machining data, and measurements will form a background for high TRL EU project.

Do existing 3rd party agreements restrict exploitation or dissemination of the data you (re)use (e.g. Material or Data transfer agreements, Research collaboration agreements)? If so, please explain in the comment section to what data they relate and what restrictions are in place.

- No

No

Are there any other legal issues, such as intellectual property rights and ownership, to be managed related to the data you (re)use? If so, please explain in the comment section to what data they relate and which restrictions will be asserted.

- No

NA

Documentation and Metadata

Clearly describe what approach will be followed to capture the accompanying information necessary to keep data understandable and usable, for yourself and others, now and in the future (e.g. in terms of documentation levels and types required, procedures used, Electronic Lab Notebooks, README.txt files, codebook.tsv etc. where this information is recorded).

The PIs will make sure that metadata (experiment date, user name, type of experiment, details of equipment, measurement units, etc.) will be added to the datasets for easy identification and data reuse.

A data description document (Read Me) will be created to record the data acquisition process and also on how to facilitate the interpretation of metadata.

Standard vocabulary (as per CIRP definitions) will be used.

Will a metadata standard be used to make it easier to find and reuse the data ?

If so, please specify which metadata standard will be used.

If not, please specify which metadata will be created to make the data easier to find and reuse.

- Yes

Please refer to the answer above.

Data Storage & Back-up during the Research Project

Where will the data be stored?

- OneDrive (KU Leuven)
- Shared network drive (J-drive)

A TEAMS share point has been created.

How will the data be backed up?

- Standard back-up provided by KU Leuven ICTS for my storage solution

Is there currently sufficient storage & backup capacity during the project?

If no or insufficient storage or backup capacities are available, explain how this will be taken care of.

- Yes

How will you ensure that the data are securely stored and not accessed or modified by unauthorized persons?

The TEAMS SharePoint is only accessible to the PIs (KU Leuven and University of Ljubljana (external) and the KU Leuven researcher involved in the project.

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

The total expected data storage volume is < 1 TB. Therefore, it is freely offered by KU Leuven.

Data Preservation after the end of the Research Project

Which data will be retained for 10 years (or longer, in agreement with other retention policies that are applicable) after the end of the project?

In case some data cannot be preserved, clearly state the reasons for this (e.g. legal or contractual restrictions, storage/budget issues, institutional policies...).

- All data will be preserved for 10 years according to KU Leuven RDM policy

Where will these data be archived (stored and curated for the long-term)?

- Shared network drive (J-drive)
- Other (specify below)

J drive of Micro -& Precision Engineering group

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

The data volume is low so no significant costs are foreseen. If needed at the end of the project, the annual costs (< 100 euros) can

be booked as consumables on running projects.

Data Sharing and Reuse

Will the data (or part of the data) be made available for reuse after/during the project?

Please explain per dataset or data type which data will be made available.

- Yes, as embargoed data (temporary restriction)
- Yes, as restricted data (upon approval, or institutional access only)

As the data is aimed at leveraging the technology readiness level for high TRL projects (e.g. EU), it will be restricted until a follow-up high TRL project has been awarded.

If access is restricted, please specify who will be able to access the data and under what conditions.

The data will only be accessible to the PIs (KU Leuven and University of Ljubljana (external) and the KU Leuven researcher involved in the project. Disclosure will be limited until a follow-up EU project is approved.

Are there any factors that restrict or prevent the sharing of (some of) the data (e.g. as defined in an agreement with a 3rd party, legal restrictions)?

Please explain per dataset or data type where appropriate.

- Yes, privacy aspects

Disclosure will be limited until a follow-up EU project is approved.

Where will the data be made available?

If already known, please provide a repository per dataset or data type.

- KU Leuven RDR (Research Data Repository)

When will the data be made available?

- Other (specify below)

Disclosure will be limited until a follow-up EU (MSCA DN) project is approved. The project application has already been submitted.

Which data usage licenses are you going to provide?

If none, please explain why.

- CC-BY 4.0 (data)

Do you intend to add a persistent identifier (PID) to your dataset(s), e.g. a DOI or accession number? If already available, please

provide it here.

- No

What are the expected costs for data sharing? How will these costs be covered?

From the CELSA project budget.

Responsibilities

Who will manage data documentation and metadata during the research project?

Dr. ir. Krishna Kumar Saxena (KU Leuven)
Dr. ir. Muhammad Hazak Arshad (KU Leuven)

Who will manage data storage and backup during the research project?

Dr. ir. Krishna Kumar Saxena (KU Leuven)
Dr. ir. Muhammad Hazak Arshad (KU Leuven)

Who will manage data preservation and sharing?

Dr. ir. Krishna Kumar Saxena (KU Leuven)
Dr. ir. Muhammad Hazak Arshad (KU Leuven)

Who will update and implement this DMP?

Dr. ir. Krishna Kumar Saxena (KU Leuven)
Dr. ir. Muhammad Hazak Arshad (KU Leuven)