

DMP title

Project Name My plan (FWO DMP) - DMP title

Project Identifier 1S62222N

Grant Title 1S62222N

Principal Investigator / Researcher Frederik Mertens

Description The project is aimed at acquiring experimental data. The goal is to study the impact of micro and nano structures as textured surfaces on heat transfer enhancement during flow boiling. In this regard, studying the basic mechanisms taking place at the small scale would allow to define optimized textures for specific applications and thus increasing efficiency and reducing cost. The data collected here are visualisations of the flow/bubble growth/detachment frequency etc on the one hand and visualisations of a new temperature measuring technique (Quantum Dots) serving as a high resolution, fast response method. The end goal is thus to be able to link the geometric parameters to the heat transfer enhancement and create models that can be used in the future.

Institution KU Leuven

1. General Information

Name applicant

Frederik Mertens

FWO Project Number & Title

1S62222N

Boiling heat transfer enhancement via textured surfaces with optimal cavities

Affiliation

- KU Leuven

Heat and Mass Transfer Group

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).

Spectroscopy data QD calibration	ASCII files	kb	Hamamatsu LED excites QD and FLAME UV-VIS spectrometer records emitted spectra
Flow/bubble visualisations	.avi .cih	TB	High speed camera recordings
QD temperature visualisations	.avi .cih	TB	High speed camera recordings
Temperature, pressure flow rate and applied heating power data	labview/NI system	Mb	Thermocouples, pressure transducers, coriolis flowmeter, power supply

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)

- 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 valorisation potential is present in all sectors/applications which use heat transfer e.g. micro-electronics, space applications, nuclear reactors....

IP topics might include: the novel temperature measurement technique (QDs), novel models relating to surface geometries pertaining to heat transfer enhancement.

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. Spectroscopy data QD calibration: Emitted spectra, relate emitted intensity to temperature value. Possible shift in peak wavelength. The used Integration time, averaging, background subtraction etc. will be included

2. Raw captured high speed camera footage of bubbles/flow collected per test conditions, included with detailed description used experimental conditions in text file format.

3. Raw captured high speed camera footage of QDs collected per test conditions, included with detailed description used experimental conditions in text file format. Also QD thickness and uniformity are parameters.

4. Sensor (thermocouple/pressure/flow rate/heating power) data acquisition using labview and NI DACq system: log per performed experiment with all applicable boundary conditions and times.

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

List experiment conditions in consequent manner.

5. Data storage and backup during the FWO project

Where will the data be stored?

The time-stamped master copy of the data will be kept on our research unit central storage facility (onedrive). Copies can be made and kept on personal devices.

How is backup of the data provided?

The data will be stored on the university's central servers with automatic daily back-up procedures.

Dedicated hard drives will also be used for easy transportable secondary backup of large high speed camera files.

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

5TB hard drives have been bought.

2TB personal onedrive storage, to be seen if need for expansion

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

Cost of harddrives: internalized/bench fee (5TB = €100 approx)

Cost of onedrive storage: 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 stored in the university's secure storage environment.

Physical harddrives are in locked room or badge-protected lab.

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, ...).

Calibration data QDs.

Visualisations bubbles and QDs in the degree of usefulness for reproduction.

All NI system data logs

Models and results derived from Visualisations.

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

1. The data will be stored on the university's central servers (with automatic back-up procedures) for at least 10 years, conform the KU Leuven RDM policy.

2. Our project will generate a large volume of data, some of which may not be appropriate for sharing since it involves a small sample that is not representative. The investigators will work with staff of the KU Leuven Libraries to determine what to archive.

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

1. The database of high speed camera recordings that will be compiled will be hosted on the servers of KU Leuven. In view of the expected size of the database (> 2 TB), estimated costs will need to be made when the final data volume is known. These costs are not expected to be that drastic.

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?

Papers will summarize the obtained results.

A full dataset can be uploaded in a central location if deemed possible and of added value.

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

- In an Open Access repository

When will the data be made available?

- Upon publication of the research results

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

Depends on possible IP related topics, but normally open access.

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

To be seen

8. Responsibilities

Who will be responsible for data documentation & metadata?

Frederik Mertens

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

KU Leuven

Who will be responsible for ensuring data preservation and reuse ?

KU Leuven

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

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