
PDMT2/23/055

A Data Management Plan created using DMPonline.be

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Project abstract:

Steel is a versatile and durable material that has helped to shape our modern world. Non-metallic inclusions (NMIs) are however inevitable in the steelmaking process and are generally considered to be detrimental to steel properties, such as toughness, ductility, and fatigue strength of the steel, as well as its corrosion resistance. This project focuses on the behavior of NMIs at the steel/slag interface, which is crucial for inclusion removal. More specifically, we will investigate the aggregation of inclusions at the steel/slag interface and the separation process across the interface. In situ confocal scanning laser microscope observation will be applied to study the aggregation behaviors. The colloidal probe atomic force microscopy will be carried out to study the separation process. Finally, a numerical model will be developed to quantify the inclusion removal efficiency by taking into account the aggregation and separation phenomenon. The obtained insights in slag and inclusion systems with a high inclusion removal efficiency are crucial to developing clean steel production processes.

Last modified: 08-02-2024

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>	Indicate: D(igital) or P(hysical)	Indicate: Audiovisual Images Sound Numerical Textual Model SOftware Other (specify)		Indicate: <1GB <100GB <1TB <5TB >5TB NA	
steel sample	small cylindrical steel sample for CSLM in situ observation of TiN inclusion	N	P	Other	solid		15 mm3/each
Slag sample	used to cover the steel surface to creat a steel/slag interface	N	P	other	solid		9 mm3/each
in situ observed images	These images recorded the behavior of TiN conclusions at the slag/steel interface	N	D	I	bmp	<100G	
TODWA images	for the slag surface tension measurement	N	D	I	JPG	<1TB	
viscosity curves	For slag viscosity measurement	N	D	T	Excel	<1 G	
slag/steel interface profile	The profile relates to the capillary force calculation	N	D	I	PNG	<1G	

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:

No existing data 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, refer to specific datasets or data types when appropriate and provide the relevant ethical approval number.

- No

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

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.

- No

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

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

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).

Steel sample	A README. txt will be provided with the samples. The following information should be given in this file. The method of how the sample is prepared: normally prepared in a vertical tube furnace, then the sample will be cut with a dimension 4 mm in diameter and 3 mm thick. The composition of the steel sample should be given as well. This information can be collected from EPMA analysis.
Slag sample	A README. txt should be provided with the samples. The following information should be given in this file. How is the synthetic slag prepared, and what is the slag composition: Al ₂ O ₃ , SiO ₂ , and CaO. These oxides will be remelted in a bottom-loading furnace at 1550 Celcius and then quenched in water.
In situ observed images	A README. txt should be provided. The behavior of TiN inclusions at the slag/steel interface will be observed in situ at 1550 Celcius using the confocal scanning laser microscope. The detailed experimental procedures should be provided in the README file. A sequence of in situ observed images will be recorded during the observation at a rate of 30 fps. These images will be used for the attractive force calculation between TiN inclusions. The procedure of the force extraction from the images should be provided in the README file.
TODWA images	A README. txt should be provided. The following information should be given in this file. The experimental procedure/parameters should be listed. The methodology of extracting the surface tension from the captured slag drop shape should be given.
viscosity curves	A README. txt should be provided. In this file, the experimental procedure/parameter should be given.
slag/steel interface profile	The interface file will be calculated from MATLAB. A detailed notation of each code line should be added in the script file.

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

The research data will be shared through KU Leuven Research Data Repository. The DataCite will be used as a metadata standard.

Data Storage & Back-up during the Research Project

Where will the data be stored?

- Shared network drive (J-drive)

How will the data be backed up?

- Personal back-ups I make (specify below)

A local hard drive (2TB) will be used for research data backup from time to time.

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?

Most of the digital data will be saved in the shared network drive (J-drive). This network drive is based on the standard file storage solution of ICTS KU Leuven. The security level is high.

The digital data will also be backed up in a local physical hard drive. A password will be set for this hard drive. Only authorized people can access it.

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

The 2TB hard drive is available from our research group for digital data.

We also have a storage room in MTM KU Leuven for the physical samples.

So, no more extra cost is expected.

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)
- KU Leuven RDR

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

No more extra cost is needed.

We have a storage room for physical samples in our group at MTM, KU Leuven.

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)

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

The promoters of this project always have access to the data. They can give the authorization to other people if it is needed.

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.

- No

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?

- Upon publication of research results

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](#).

- Yes, a PID will be added upon deposit in a data repository

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

There is no extra cost for the data sharing through KU Leuven Research Data Repository.

Responsibilities

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

The found holder, Zilong Qiu (zilong.qiu@kuleuven.be).

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

The found holder, Zilong Qiu (zilong.qiu@kuleuven.be).

Who will manage data preservation and sharing?

The found holder, Zilong Qiu (zilong.qiu@kuleuven.be).

Who will update and implement this DMP?

The found holder, Zilong Qiu (zilong.qiu@kuleuven.be).