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## Plan Overview

*A Data Management Plan created using DeIC DMP*

**Title:** Breaking the strength-ductility paradox by stacking fault energy design

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**Template:** DTU data management plan

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### Project abstract:

The Holy Grail in tailoring structural materials is to develop materials with a targeted combination of high strength and high ductility. In general high strength is accompanied by low ductility and vice versa: the strength-ductility trade-off or paradox. Changing the deformation mechanism in metals from dislocation movement (SLIP) to mainly TRIP or TWIP effect, the paradox could be by-passed. A design parameter to tailor TRIP/TWIP vs. SLIP is the stacking fault energy (SFE). The present project will combine ab initio modelling to calculate the SFE in plastically anisotropic multi component materials with in-situ TEM and XRD to determine the SFE experimentally, and validate the models. Subsequent crystal plasticity modelling and thermodynamic modelling predicts alloy compositions for optimal high strength-high ductility. F.c.c. multi-components alloys as austenitic stainless steels and high entropy alloys will be investigated.

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### Copyright information:

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# Breaking the strength-ductility paradox by stacking fault energy design

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## Data Collection

Describe the data that will be collected.

What type of data will be collected?/How will the data be collected?/Which file formats are the data in?

- images for various types of microscopy (.TIFF),
- raw data from diffraction experiments in laboratories and at synchrotrons (.RAW)
- analyzed data will be saved in Origin and Excel files
- modelling results from first principles (VASP)
- modelling results from thermodynamic modelling (ThermoCalc)
- modelling results from crystal plasticity (matlab)

File formats are given above as far as currently know.

**What are the estimated amounts of data?**

Estimated amount of data <2Tbyte

**How will the data be structured?**

Data will be structured after the various project participants (1 Post Doc + 1 PhD) and the various materials to be investigated.

**How will the data be versioned?**

Data will be versioned chronologically.

Describe any restrictions to the data.

**Are there any limitations on the use of existing data**

No limitations after publication, unless patenting options emerge.

**Are there any ethical or legal issues to be considered?**

No ethical issues. Legal issues are covered by NDA among project partners.

**Are there other external requirements?**

No.

## Data Storage

Describe the IT infrastructure to be used.

**Where are the raw data and results stored?**

Raw data and results will be stored on the individual M: drives of project participants and the O: drive with access for all DTU project participants.

**How are the data backed up?**

Back up is taken care of. Data area backed up by AIT using DTUs standard procedure for backup of the M: and O: drive.

**How is access control managed?**

Access to the data are controlled by access lists managed by DTUBasen allowing the PI to control access to the data.

**How are data shared within the project?**

Sharing among project participants via O: drive; sharing with external partners via files.dtu.dk.

Sensitive data is protected by passwords.

## Documentation

Describe the metadata to be associated with the data.

**Are there metadata standards?**

All project participants are requested to keep a log book of their experimental research activities and appropriate ReadMe files for modelling results.

**What metadata will be included?**

At the end of the project the physical log book will be stored by the PI and a digital copy will be stored on the O:drive (not to be shared, only accessible for the PI). ReadMe files accompany the results on the O: drive.

**How will the metadata be generated?**

Metadata is generated manually by the project participants.

Describe the types of documentation that will accompany the data.

**How will data be documented?/How will the data be understandable for secondary users?**

Data will be documented and made understandable for secondary users by ReadMe files.

**How will reproducibility of results be ensured?**

Reproducibility will be ensured by detailed description of how the laboratory experiments and modelling activities were achieved. The reproducibility of experimental results is verified by repeating the tests (as always!)

## Data Sharing

Describe which data will be shared.

**Which data will be shared?**

Published experimental and modelling results and supplementary (unpublished) experimental results that corroborate the work, will be shared.

**Which tools/software are needed to view/visualize/analyze the data?**

The published data will be accessible through software that is universally available.

**Which data cannot be shared?**

Data that will be used for possible patents will not be shared.

**Who will have access to the data?**

Access is given to colleagues in the field after dialogue with the PI (not to commercial enterprises)

**Describe how the data will be shared for possible reuse.****When will data be shared?**

Data can be shared after publication.

**Where will data be shared?**

Sharing through DTU data: data.dtu.dk

**How will the data be made discoverable?**

Discoverable via DOI.

## Long-term Preservation

**Describe how data will be archived beyond the scope of the research project.**

This will be considered in the future.