

Data Management Plan

The following data management plan is proposed for collecting, archiving, and reporting research and education results associated with this proposed project. The proposed project is fundamental research and therefore, all the data obtained will be nonrestrictive, and will be collected and archived for public access. All the research data collected as part of this project is owned by the University of North Texas. The PI (Zheng) will take the responsibility for collection, management, and sharing of the research and education data.

Expected Data:

This project will produce computational simulation and experimental results related to the microstructure and deformation in nano-crystalline thin film. The data can be available to the materials scientists worldwide for understanding the deformation mechanism in nano-crystalline thin film with the influence of residual stress gradient. Specifically, research data related to the proposed project include:

- Digital images and videos showing microstructural features in nano-crystalline thin film, during different mechanical process, recorded via ex-situ and in-situ characterization, using scanning electron microscopy (SEM), transmission electron microscopy (TEM), aberration-corrected scanning transmission electron microscopy (STEM), and 4D STEM.
- Chemical composition data in nanoscale local solute segregation in nano-crystalline thin film collected using SEM-XEDS, S/TEM-XEDS and atom probe tomography (APT)
- Computational codes to simulate the deformation behavior in nano-crystalline thin film under different residual stress gradient.
- Products yielded from the project, including but not limited to journal publications, and conference proceedings, annual reports, summary report, presentations, posters, patents, teaching and outreach materials

Data formats and dissemination:

In addition to reporting to NSF, major research and education results will be published in peer-reviewed journals and presented at conferences. Archived journals will be the primary places to disseminate the research results including: *Advanced Materials*, *Acta Materialia*, *Scripta Materialia*, *Materialia* and others focusing on advanced alloys and electron microscopy. Conferences that the research results will be presented include: TMS annual conferences, MS&T annual conferences, MRS meetings, and Microscopy and Microanalysis annual meetings. In addition, the results obtained from the proposed project will form the major part of the Ph.D. dissertation of the participating graduate student, that will be archived in the Department of Materials Science and Engineering at the University of North Texas, and UMI dissertation services.

A dedicated webpage will be created on the PI's website. All the publications resulted from the project and links to the papers will be listed on the webpage. The web page is designed to disseminate the data and to expose the project to a broader audience. The primary forms of data will be digital images of the microstructure, videos from in-situ experiments, computational codes, results related to deformation in nano-crystalline thin film, and results related to the proposed education modules. The data will be distributed in the widely used format so that people can access directly without any difficulty as follows:

- Digital image data will be processed and stored in a dedicated computer in the PI's lab in TIFF uncompressed (.tif) format and JPEG2000 format.
- Videos will be in .avi format in both raw and compressed forms.
- Computational codes will be in ASCII text files.
- Documentation will be provided as PDF.

The use of the data is nonrestrictive and is required to follow the policies:

- For the results that have not been published in a journal or at conference proceedings, the user will be requested to cite or acknowledge the PI's website for the use of the data.
- For the results that have been published in a journal or conference proceedings, before the user is allowed to download the digital data/images/videos, the user will be asked to also obtain appropriate permissions for the use of the results if the publisher of the journal or proceedings owns the copyright of the published results.
- For the videos obtained from the in-situ experiments, if the current journal papers do not allow the inclusion of video clips, it is planned that references will be cited to the dedicated websites so that the interested readers can get access to the videos to facilitate the understanding.

Data storage and preservation of access:

The PI will be responsible for the maintenance of the data storage and ensure the preservation of access. The University of North Texas, is going to create an Archival Storage where the research data from this project will be permanently deposited.

- Two master copies of all the data (raw data and processed and reduced data) will be stored in two dedicated external computer hard drives.
- Reduced data that has been published in archival journals and conference proceedings will be kept in the dedicated computer for easy access.
- The data available for direct access by the general public on the dedicated website will be permanent.

Period of data retention:

All the data generated from the proposed project will be retained by the PI as part of his permanent collection in addition to the permanent storage by the university. The major form of dissemination of the results from the proposed research will be journal publications. Submissions of the academic papers will be made timely after the generation of sufficient data. After publication, all the digital data related to the graphs, tables, and images in a publication will be accessible by the public immediately.