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# CAREER: Nanoscale Thermal Transport in Hydrogen-Bonded Materials

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## DATA MANAGEMENT PLAN

The PI has developed a data management plan for all academic research associated with the proposal.

### Roles and Responsibilities

The primary members of the research team are the PI and 2 PhD students. The PI will work with the PhD student to train him/her in correct methods for collecting and organizing data. The graduate student and the PI can sign off on each other's work but undergraduates must have their work signed by one of the primary members of the research team. Monthly reviews of the research notebooks are conducted by the PI and correlated with the information in the reports. All of the reports will be saved as secure files on the universities' servers and backed up. The PI is responsible for maintaining continuity of the data in the event that personnel change on the project. Archiving of both physical and digital data for public access will occur utilizing the strategies detailed below.

### Expected Data

There are several classes of data that will be generated or maintained by this project: 1) modeling data, 2) measurement data, and 3) publication data. Data collection and storage will be managed by 1) research notebooks that document the day-to-day work conducted on the project, 2) modeling and experimental results, 3) progress reports summarizing the work for specific periods, and 4) dissemination of the results (e.g. videos and graphs). The raw computer models will be available in executable files upon request within 10 business days. The data may include simulation input and output files, measurement results, published tables, numbers for making the published graphs, and curricula developed as a result of the project, in addition to metadata such as descriptions of computational codes and methods, and simulation parameters.

### Period of Data Retention

Research notebooks and hard copies will be stored at USU for at least 11 years. Reports and computer generated data will be backed up and stored for 17 years after the end of the project. In accordance with the universities' auditing practices, all lab books are readily available.

### Data Formats and Metadata

Computer generated data and reports will follow a uniform protocol in file names and stored in pdf format. File names reflect the simulation name, model name and date of the tests. Hyphens and underscores are used and no spaces are allowed. An example will be EC-Test\_model-A\_06-06-2015.pdf. A metadata structure describing the filenames and indexing the files will be created and maintained by the PI. The metafile format will be enforced. The intellectual property or rights to the data generated by this project will be governed by the policies of USU, the sponsor (National Science Foundation), and other entities as appropriate. Collaboration of data users with the PI will be encouraged.

### Data dissemination and policies for public access, sharing and publication delays

There is no restriction to disseminating the data. In fact the purpose of the research is to facilitate scientists and engineers in obtaining the information and incorporating it into their designs. It is expected that 2-4 journal papers will be published annually with results collected from the research. The PI and the institutions share rights to the data. The project aims to provide transparent access to data and modeling within a timely manner.

### Data Storage and Preservation of Access

Data will be stored in the research laboratory and USU's computers. In addition to the investigators' specific backup routines, data will be backed-up daily onto portable drives, external hard drives. At least two monthly backups and their incremental backups will exist at any given time. USU's Center for High Performance Computing (HPC) provides central resources for handling large amounts of data by USU researchers and their associated graduate students. All data is served securely in the HPC and are

accessible through the campus network or VPN when off campus. Common directories will allow all users to share protocols, research findings, and prepublications.

### **University Research**

Findings obtained during this research project will be disseminated to the general public in an appropriately prompt manner along the following paths:

1. Internal review and discussion (individual research group meetings and occasional meetings with USU Technology Commercialization Office as appropriate)
2. Conferences and published proceedings
3. Peer-reviewed publications that are available in electronic format (nominal cost/open access)
4. Thesis archival in USU Digital Commons (free to public).

The point at which this data is available to the general public is generally very early in the research process through the group's research website, as well as student and faculty presentations at national/international conferences. In this manner, preliminary data is made available to the scientific and general community in a timely manner. Completed data sets are made publically available through journal publications and published theses.

### **Website**

A dedicated website for this project will highlight research and outreach activities. This site will be maintained by the PI. All models, publications, posters, and presentations associated with this project will be archived and freely accessible through this website. For copyright/IP protected publications, we will provide links to publisher/patent office websites. We may also provide unformatted versions of publications without any copyright conflict.

### **Recognition of NSF**

All publications, presentations, and public announcements containing the information or data obtained during the proposed project will accurately and clearly acknowledge the National Science Foundation as the funding source.