

## **Data Management Plan**

In general, the PIs will ensure the availability of project data. If one of the PIs leave the institution, the other one will take over his/her responsibility to guarantee the complete data access. As a general rule, data will not be made public until there is sufficient data and repetition of experiments and checks of both the simulation and the experiment to ensure that errors have been removed.

The scientific data generated during this project will be disseminated and shared with the scientific and engineering community through peer-reviewed journal publications, conference presentations and proceedings, and through reports that highlight the major outcomes that will be posted to professional society websites, the NSF website where appropriate, and elsewhere. The data management plan outlined below provides details regarding expected project data, the duration of their retention, primary data format, and data storage and dissemination.

**Expected project data:** The proposed studies are expected to generate data on the design, fabrication, and characterization measurement of proposed devices. These results will be published in peer-reviewed journals or presented at conferences, such as the Materials Research Society (MRS) meeting, the Optical Society of America (OSA) meetings, Society of Photographic Instrumentation Engineers (SPIE) meetings, and Institute of Electrical and Electronics Engineers (IEEE) meetings. Specifically, the expected simulation results will include related codes and computer-aided design (CAD) files. The expected measurement data will include the recorded spectrum and microscope of materials, and recorded performance of the devices during the test. The expected fabrication data will include fabrication process parameters. Other project data will include curriculum materials (including lecture notes, tutorials, homework, quiz, and exams), workshop materials (including presentation files, and tutorial notes), and summary for the educational activities.

**Period of data retention:** Our minimum planned data retention period is three years following the conclusion of NSF support for this project or three years following public release, whichever is later. In practice, we frequently retain data for a much longer period of time (e.g., decades). An extended period of data retention will be implemented for students working on the project prior to their graduation or thesis/dissertation completion. Research data that support patents will be retained for the entire term of the patent.

**Primary data format:** Planned major data formats include \*.pdf files (data such as the summary/report, experimental data, papers, lecture notes will be stored in this format), \*.dxf files (data such as the CAD models of the design devices will be stored in this format), \*.jpg files (data such as the SEM images of the fabricated samples, pictures of the experimental setup, and pictures of the educational activities will be stored in this format). Other data, not published or otherwise available in the theses of students participating in the project, will be made available as picture format files (\*.jpg, or \*.pdf files), as appropriate.

**Data storage and preservation of access, and dissemination:** For electronic deliverables of this project, the bulk of data generated by the project will be stored by the university data storage system that are meant for long-term storage.

For hardware deliverables of this project, we plan to archive them in PI's labs. This will enable easy management and future re-use of the hardware for continuation of proposed research directions.

Every effort will be made to ensure public release of data occurs at the earliest reasonable time. We will make timely submission of results to highly ranked and indexed scientific/technical journals, and the data will be set available immediately following the acceptance of the paper, as it the common practice, unless such data is explicitly "embargoed" by the journal.

When possible, theses, dissertations, and papers published as a result of the proposed project will be made available on public websites (e.g., faculty members' websites, library website, or institutional repositories). This will make many of our results available in portable document format (\*.pdf).