

Data Management Plan

Collaborative Research: PIC: Slow Wave Enhanced Electrooptically Tuned Michelson Interferometer Biosensor for On-Chip Dual Polarization Interferometry

1. Types of Data, Curriculum materials

During the project, a large variety of distinct data will be generated. The data will consist of design databases that implement the various proposed optoelectronics circuits and systems as well as test benches, source code for software developed as part of the project, CAD layout for multi-project wafer (MPW) runs and associated mask layout for fabrication, simulation output and experimental data produced in the course of project research. It will also contain data containing various experimental parameters for the structures of devices, data generated during characterization, and analysis, e.g. analyzed data, e.g., propagation losses of slow light waveguides, phase shifter lengths of strip and slow wave waveguides, multi-project wafer (MPW) layouts, photolithography mask layout CADs for post-MPW fabrication, experiment descriptions of fabrication of above devices, dual polarization interferometry measurements of thickness and refractive index, laboratory notebooks, computational codes and input files, etc. In addition, the proposed research will yield physical samples, e.g., slow light enhanced electro-optically tuned asymmetric Michelson Interferometer devices and data on their performance in fringe shift versus bias voltages and monitoring real time thickness and refractive index during the different steps of the biosensing process. The instructional and outreach materials such as lecture slides, web-based resources, and results will also be stored. In addition, student theses and interim reports, equipment or software documentation, and similar data will contain more detailed descriptions of experiments, materials, fabrication procedures, etc. The publications, documentation, web site content, and project and participant data for reporting to NSF will also be stored.

2. Standards to be used for Data and Metadata format

The formats used for the types of data described above are dictated by standard industry and research practices. Specifically, these formats are as follows:

- Simulations will be primarily performed using 3D Electromagnetic Wave simulation software such as Lumerical Device (Heat, Charge), MODE, FDTD, and Interconnect for various device simulations. Data from the simulations will be analyzed within the domain of their respective softwares. Analysis of the output from the simulations will be in the form of text files transferred into EXCEL and MATLAB for analysis and graphing.
- Analog and digital netlists will be in plain ASCII format.
- MATLAB models will be in plain ASCII format.
- Experimental characterization and analysis will be in document format containing Microsoft (MS) Word, .txt, image files in .jpg, .html format.
- The lecture slides in MS PowerPoint and .pdf format.
- The program evaluation data, student's project report, and publications in .doc, .pdf format.
- Web-based resources in html format.

The contextual details (metadata) that are needed to ensure the usability of the data are provided by the design tool frameworks themselves. The entire design, simulation, and verification process, along with detailed documentation, is captured in the form of project files that manage the design process.

3. Policies for Access and Sharing, and Provisions for Appropriate Protection or Privacy

All data (excluding information protected by privacy concerns such as student's demographic data etc.) of this project will be made available to the worldwide community of researchers and educators via a central Web server maintained by the PIs. This server is currently available and no additional resources (hardware or personnel) are needed. The server will be accessed through links on the PIs' websites.

The complete data will become available upon the completion of the project; selected portions of the data will also be available incrementally as results are being disseminated to the research and educational

community. Access will be provided to qualified researchers and educators upon approval from the PIs following email communication with the PIs. There will be no charge for access to the data.

The UNT Libraries and College of Information have recently established a digital repository for faculty and student research data, publications, and reports. UNT Faculty Senate and Administration recently approved an Open Access Policy for faculty scholarly activities and publications. All data derived from this research will be provided to this repository and will be made available to the public through open access. However, the designs represented by the data may be patentable. In that case, consultation with the university's intellectual property representatives will provide the specific terms of their release. All the websites of the various departments at UNT are approved and managed by the Information Technology Services of the corresponding colleges.

4. Policies and Provisions for re-use, re-distribution

We will create an infrastructure for collaboration, education and dissemination between the two research groups, as we have already done in the past, to engage our students, our industrial and academic partners, and to share the research and pedagogical results from the research. Bi-weekly meetings will be held between Dr Chakravarty and Dr Rout to understand the mutual progress of the research towards integration of the thin film barium titanate modulator in the asymmetric Michelson interferometer biosensor circuit. In general, no permission restrictions are expected to be imposed on the data except for patentable designs. It is anticipated that researchers in academia and industry in the fields on optoelectronics and nanoelectronics design and education will be the groups most likely to be interested in the data. The data's foreseeable uses will be the replication and expansion of the PIs' original designs. There are no specific reasons that would prohibit the dissemination or sharing of the data.

For software and intellectual property generated under the proposed project, we will consult with the Office of Technology & Entrepreneurial Partnerships (OTEP) at the University of Dayton to ensure that results are made available to the research community as efficiently as possible while protecting the intellectual property rights of the university and inventors/authors.

5. Plans for Archiving and Preservation of Access

Source code will be maintained by storage in a community repository that provides suitable archiving and distribution facilities, such as Sourceforge or Github. Web data, publications, and documents will be distributed via the project web page. The team will procure webhosting services from University of Dayton Information technology (UDIIt) to ensure a professionally managed environment with appropriate failover and data backup facilities. This environment will also provide storage for project documents and participant data through a document management portal.

Operational responsibility for management of all systems and performance data will be vested in the PI Dr. Swapnajt Chakravarty, and he will oversee operational responsibility for management of these data.

The University of North Texas (UNT) Libraries and College of Information have recently established a digital repository for faculty and student research data, publications, and reports. UNT Faculty Senate and Administration recently approved an Open Access Policy for faculty scholarly activities and publications. All data derived from this research will be provided to this repository and will be made available to the public through open access. However, the designs represented by the data may be patentable. In that case, consultation with the university's intellectual property representatives will provide the specific terms of their release. All the websites of departments of Physics, Computer Science and Engineering, and Engineering Technology of UNT are approved and managed by the Information Technology Services of the corresponding colleges.

At UNT, data will be maintained and archived at the PI Dr Rout's office and laboratory computing facilities. Project results, such as conference and journal papers and seminar/workshop materials will be available from the PIs' web site as well and will also be archived as part of the project's archival and backup procedures. Since the storage facilities are abundant, it is anticipated that the data will be retained indefinitely as long as possible. Any samples, hardware, and tools of this project will be stored in the Ion Beam Modification and Analysis Laboratory in the basement of Physics.