

## **Data Management Plan**

### **GOALI: Novel 3-dimensional microphotonics for high-efficiency color-mixing to enable solid-state lighting.**

The objective of this GOALI proposal is to enable high-efficiency white and color lighting via a novel computer-generated microphotonic optic. This new optic, which we call a polychromat will not only combine the output from distinct red, green, blue LEDs, but also condition the angular distribution of the combined output. The proposed research is a collaborative effort between the University of Utah and a small business, LumArray, Inc. The design and fabrication of the polychromat as well as a prototype module will be conducted at the University of Utah. A process for grayscale (3-D) micropatterning will be developed using the novel zone-plate-array-lithography technology at LumArray, Inc. The post-doctoral associate will spend up to one year at LumArray researching this process. Any intellectual property including copyrighted software and data will be owned according to the mutual intellectual property agreement, which is uploaded as a supplementary document in this proposal. Any data that is relevant to filing of intellectual property claims will be archived internally as described below. Restricted access to this data will be made available under non-disclosure and confidentiality agreements. Once all intellectual property requirements (such as foreign filing of patents) are fulfilled, this data will be made available fully. Relevant data that is not subject to intellectual property limitations as agreed to by both the University of Utah and LumArray will be archived and managed as described below.

Research data that will be managed include:

1. Software and algorithm descriptions for the design of the polychromat. Clearly, the software will be subject to copyright limitations and the algorithm could be the subject of future patents. The data will include standard operating procedure (SOP) for the software and the algorithm including any sensitivity analysis to study tolerance to fabrication and system-level errors. The data will be archived as described below.
2. Fabrication process for the polychromat. As part of the research, we will explore at least two distinct fabrication approaches. These processes will be thoroughly documented including any negative results. Typically, such data is included as supplementary information in resulting publications, but will also be archived as described below. A standard procedure for all successful processes will be generated and archived.
3. Assembly of the prototype system. Details of the parts of the prototype system and steps taken to assemble the system will be documented and archived.
4. Characterization results. Raw data from the spatial-spectral measurement of the light intensity distribution will be archived. Any subjective color measurements such as those based on the color-rendering index (CRI) will be carefully explained as metadata.
5. Final products (publications, presentations, etc.) will be archived in so far as it is permissible by the publishers. Additional table of contents notes will be included about where the data for each figure, table, conclusion, etc. is archived.

The data will be archived at the end of the project in USpace, our institutional repository described below. During the project it will be stored and backed up on stand-alone computers in the (locked) lab of the PI.

Research data will be stored in USpace, the University of Utah's institutional repository, a long-term digital archive containing scholarly or artistic work produced by researchers at the University of Utah. USpace is managed by the three libraries on the University of Utah campus. The research data from this project will be managed by the USpace and data management team at the main library, J. Willard Marriott Library. They will provide uploading, metadata, searching, and access control services. The PI will be responsible for working with the USpace and data management team to transfer the data to the Library by uploading to USpace at <http://uspace.utah.edu>. USpace staff will receive the file(s) and descriptive information and upload to the repository. USpace staff will apply metadata and contact the researcher with any questions to ensure that the uploaded information is correct. The PI will provide a summary of the research and descriptive terms to be used applying metadata.

CONTENTdm Digital Collection Management Software is the software platform used for the data repository service (and the Library's institutional repository service). CONTENTdm is a product of OCLC <http://www.contentdm.org/> and fully compliant with OAI-PMH version 2.0. It is administered by the IT staff of the Marriott Library who is responsible for its maintenance, upgrading, and security. CONTENTdm supports ten integrated thesauri from OCLC Terminologies Services including Dublin Core Metadata. Custom controlled vocabularies can be imported or developed as needed.

Research data residing in USpace is openly accessible on the World Wide Web. The PI will transfer the research data from this proposed project to the Library after completion of the research. If patents (or copyrights in the case of software) result from the research, then the data will be suppressed until patents/copyrights have been received. Otherwise the data will be suppressed until all submitted papers have been published. Research data will be fully accessible via USpace for a period of time deemed relevant for the data, typically 5 years for the raw data described above, but not less than three years. Final products will be maintained indefinitely. In the event the PI leaves the University the data shall remain in USpace for a period of 5 years.

Research data deposited in USpace receive a persistent URL (reference URL) that will not break. Each item in USpace can link to other items in USpace and the World Wide Web. The data from the proposed research can be linked to the published research article.