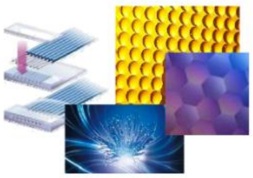
High-precision Fabrication Facility for Optical Sensing and Imaging Technologies



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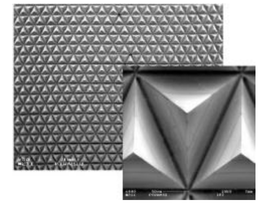

College of Engineering, College of Science, AgriLife, Vet School, Health Science Center

Total Request Amount ($): $2,574,258.58 (RDF fund) + **$500,000.00** (BME match)

This proposal seeks funding for the acquisition of a suite of industry-level tools for high-precision prototyping and intelligent fabrication platforms that will position TAMU as a leader in the strategic area of *advanced optical and photonic devices*. This proposed acquisition will directly complement existing manufacturing facilities in which Texas A&M has recently made significant investment and support >15 grants from NSF's Manufacturing programs at least five grants from NSF, NIH, and DARPA towards medical innovations based on advanced manufacturing technologies. The proposed procurements are key additions that will create an *unprecedented facility in the university setting for free-form fabrication*.

The facility will assemble a combination of mechanical (diamond turning, molding) and optical (multiphoton laser photopolymerization) tools that will go beyond the symmetry of the traditional designed optics / photonics. This will enable entirely new imaging modalities requiring complex and freeform geometries (e.g. snapshot spectro-polarimetry imaging critical in stand-off high speed detection). A key attribute of free-form fabrication is the ability to simplify designs and decrease both size and cost of parts. Provides capacity for small and medium volume production at TAMU, allowing for efficient clinical studies by providing disposable or at least rapidly-replicated systems. Further, it supports rapid translation to industrial manufacturing.

While the tools are broadly general, the emphasis of the facility will be for producing novel optics/photonics devices and development of imaging/sensing instrumentation. These topics are still relevant across multiple fields, where TAMU faculty are already strongly engaged but have limited capability to locally manufacture optical systems. This will enable further multi-departmental collaborations, linking system development and numerous applications from biomedical to defense, as well as agriculture, space exploration, and environmental monitoring. Major NIH research grants and program projects (R01, BRP, P41) require custom new functionality diagnostic instruments to be implemented in clinical/pre-clinical studies. NASA's BRASH and ESTO IIP programs will need optical system engineers along with biomedical and agricultural engineering specialists for space medicine and environmental imaging.

The long term vision for the facility is to become a part of a new ERC and/or NIH Technology Center for Photonic/Biophotonic Systems Manufacturing. This will be possible when expanded through parallelization of additive fabrication methods for optics/photonics and linking it into the Manufacturing USA initiative. In the short term, the facility will support both new and existing programs. For example, point of care diagnostic and wearable devices, and associated fabrication processes will be brought closer to industry, an activity that strongly matches expected outcome of the PATHS-UP NSF ERC. Industrial Engineering programs will benefit from development of new manufacturing processes, while CS&E, Physics, and AgriLife groups will profit from applications in area of remote sensing, defense and space applications (the facility will be capable of building for example custom IR / hyperspectral systems for remote detection for both commercial and defense, smart farming etc.). An important aspect of the facility will be also building strong links with industry both in terms of training TAMU graduates and creating new academic-industry partnerships.