Establishing an Interdisciplinary Manufacturing Facility (IMF)

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Total Requested Amount: $952,000

Summary:

A multidisciplinary team of PIs representing 4 colleges at Texas A&M University (TAMU), namely, Engineering, Architecture, Veterinary Medicine, and Science, as well as the TAMU-Health Science Center, request research development funds to establish a shared ***Interdisciplinary Manufacturing Facility (IMF)*** *in the Emerging Technology Building. The funds are mainly requested towards procuring a* ***hybrid manufacturing setup (3D printer),*** *a* ***3D-Bioplotter®,*** *associated components, as well as performing essential facility upgrades*. The proposed procurements are vital additions to ~$5M of equipment and instruments already pooled from participating departments and being installed as part of a 5000 sq. ft. space with multi-year technician support from TEES (~$200K), and maintenance and service contract support from the participating department heads ($210K). The proposed IMF will impart TAMU with the capability to create and characterize components and specimen made with materials, ranging from soft tissues to ultrahigh strength materials of widest possible scales, for broad-based applications.

A *Hybrid Manufacturing* printer is perhaps the only platform that allows *"sculpting"* objects by a concurrent combination of material deposition (through laser sintering), removal (machining) and shaping (forming). It is capable of working with multiple metals simultaneously, being able to mix and match four simultaneous metallic powders to create complex shapes and combinations of materials that can be precisely tailored locally to create next-generation artifacts.

One of the most important and promising recent advancements at the intersection of medicine and engineering is the ability to "print" tissues and organs. The *3D-Bioplotter®* can fabricate scaffolds using a wide range of materials including soft hydrogels over polymer melts, and hard ceramics. The system is designed to support the development of tissues and devices vital to the success of regenerative therapies, controlled drug release, and patient-specific implants.

The proposed request is closely aligned with TAMU's strategic interdisciplinary thrusts, especially related to advanced manufacturing and innovation. It was noted by a multidisciplinary group of 35+ faculty (and its 100+ affiliates) in the TAMU system that an IMF is pivotal to boost and sustain its nascent success in collaborative ventures (e.g., 14 grants from different NSF's Manufacturing programs, and 4 grants from NSF, NIH, and DARPA towards medical innovations based on advanced manufacturing technologies since Jan 2014), as well as to showcase and prime TAMU into a major aspirant for national leadership grants (e.g., ~$150M Institute for Manufacturing Innovation in *Smart Manufacturing* and *Extreme Environment Materials*).