

## Research Development Fund – SPRING 2019 Application Template

SUBMISSION DEADLINE: \*\*\*\*EXTENDED\*\*\*\* **Monday – March 4, 2019 at 12 noon CDT** to [rdf@tamu.edu](mailto:rdf@tamu.edu)

**\*\*Applications that exceed page limits for any section or do not follow template will not be reviewed\*\***

**Application Title:** *Enhancing Materials Processing Infrastructure at Texas A&M University*

### **Lead contact for RDF Application:**

**Name:** Miladin Radovic and Svetlana Sukhishvili

**Department:** MSEN

**Email address:** [mradovic@tamu.edu](mailto:mradovic@tamu.edu) and [svetlana@tamu.edu](mailto:svetlana@tamu.edu)

**Phone number:** 979-845-5114 (MR) and 979-845-3081 (SS)

**Key Participating Units:** Materials Characterization Facility (MCF), Soft Matter Facility (SMF), COE/TEES, COS, Geosciences, AgriLife

**Anticipated Request Amount (\$): \$1,495.003.26**

### **Executive summary of this application to utilize Research Development Funds:**

This proposal is addressing core needs for enhancing infrastructure for research activities in the area of materials processing and synthesis as a key component of Manufacturing Initiative at TAMU, and nationwide. Recent investments, including those from RDF fund in 2015 and 2016 have significantly advanced our materials characterization capabilities at Materials Characterization Facility (MCF) and newly established Soft Matter Facility (SoMF). Those facilities has been more recently enriched by the Hewlett Packard's generous donation of nano-fabrication and characterization equipment, including Titan High resolution Transmission Electron Microscope (HR-TEM). However, key missing elements to our current facilities include tools for *in situ* characterization of chemistry and microstructure evolution during thermal or thermo-mechanical processing of materials, equipment for characterization of powders as a key precursors for additive manufacturing, composite materials and catalysts, among others, as well as tools for accelerated processing of materials (alloys and composites) with different compositions. Thus, faculty across the COE and COS are seeking 6 new sets of tools that will allow: (1) in situ monitoring of chemical and microstructural changes during thermal and thermo-mechanical treatment of materials in Tescan Fera SEM/FIB; (2) thermogravimetric analysis with simultaneous mass spectroscopy up to 1200°C; (3) Particle size and shape analysis in the wide range from 10 nm to 5 mm; (4) better preparation of samples for detailed microstructural characterization using Titan HR-TEM; (5) accelerated processing of materials with different composition (alloys); and (6) accelerated additive manufacturing of metallic and ceramic materials.

Proposed instruments are key to addressing new materials design in numerous areas from aerospace industry and biomedical implants, to corrosion mitigation, engines, and tribology, and would strongly support recent new faculty hires across the campus by attracting top experts in the area of materials processing and manufacturing. TAMU researchers already have significant research expertise in these areas, and the acquisition of these tools will elevate the TAMU to the highest level in the area of manufacturing that is a currently the top national research and development priority. Moreover, proposed tools are not available at nearby institutions, and even more, some of them will be the only one of the kind in the nation, making these resources regionally and nationally important. Last but not least, this equipment will allow training of future experts in materials processing equipment, thus making our graduate students competitive.

Our overall request for the instrumentation and upgrades are budgeted across 2-years with the request distributed in order of priority to ensure the introduction of these tools in a logical sequence. The requested equipment will be located at MCF and SoMF and available not only to TAMU research community but also to researchers from other academic institutions and industry through well developed user programs in those facilities.