Research Development Fund – FALL 2019 Application Template
SUBMISSION DEADLINE: Monday--October 14, 2019 at 12 noon CDT to rdf@tamu.edu
Applications that exceed page limits for any section or do not follow template will not be reviewed

Application Title: Expanding Trace Elemental Analysis Capabilities for Researchers at TAMU
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Key Participating Units: CoS, CoE, CoGS, CoALS, CoLA, TAMHSC
Anticipated Request Amount ($): 604K

Executive summary of the intended application to utilize Research Development Funds.

The Elemental Analysis Lab has been helping users measure trace elements successfully through NAA and ICP-MS for over fifty years. Hundreds of researchers have used the facility to win grants and make breakthroughs in research in nearly all areas of research at TAMU. However, in today's world, lower detection limits and cutting-edge measurement techniques are needed for investigators to continue groundbreaking work and to remain competitive for grants. To meet these challenges, the EAL is seeking funding for five new instruments and significant enhancements to lab space to provide TAMU researchers with trace/ultra-trace element measurement tools, to train students, staff, and faculty to obtain high-quality data from these tools, and to enable competitive funding proposals.

A new, state-of-the-art quadrupole ICP-MS with collision-cell technology, to replace the current 10-year old instrument, will provide such enhanced sensitivity that sub-ppt detection limits can be achieved for many elements. Even more remarkable, the increased sensitivity enables discrimination at small scales, so that the metal content of individual nanoparticles or biological cells can be accurately quantified.

Furthermore, an increasing number of funding opportunities require the measurement of specific metallic species (e.g., organic vs. inorganic arsenic), not just the total metal content. When combined with inline chromatographic separations, ICP techniques are widely accepted as the most efficient and reliable methods for performing such measurements. The addition of a modern HPLC will open new avenues for quantifying trace metals by their chemical forms through the combined technique of HPLC-ICP-MS.

The addition of an efficient, robust ICP-OES will serve three very important purposes: (1) It would off-load work that is currently performed with ICP-MS, thereby allowing the ICP-MS to be reserved for the most demanding of applications; (2) it would increase sample throughput and reduce labor and material inputs relative to ICP-MS without sacrificing analytical quality; and (3) it would immediately enable the determination of important elements that are difficult to measure with ICP-MS (e.g., S and P).

Beyond performing measurements, preparation of samples for analysis is an art and science in its own right and requires expertise, infrastructure, equipment, and materials that are not widely available to the research community at TAMU. A new trace analysis workspace will be equipped with the latest in microwave-assisted sample digestion and dry-ashing equipment, trace analysis grade labware, and an automated sub-boiling distillation instrument for generating ultra-high purity acids. Just as importantly, facility users will receive the necessary training for their proper use.