

Application Title: Enhancing Elemental Analysis Facilities for Researchers at TAMU

Lead contact for RDF Application:

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Key Participating Units: COS, COE/TEES, Geosciences, AgriLife, HSC, CVM

Anticipated Request Amount (\$): 1.04 million

Executive summary of the intended application to utilize Research Development Funds. The present proposal seeks to upgrade infrastructure and acquire new capabilities in order to improve an existing key elemental characterization facility for researchers in TAMUS. The choice of new instrumentation will be specifically targeted at closing known analytical gaps in present capacities, in terms of both difficult elements and difficult matrices. Upgrades of laboratory infrastructure will provide researchers University-wide with access to first-class trace analysis preparation facilities. There exists a need in TAMUS for access to a facility for performing chemical elemental analysis, starting at the primary constituent level and down to even ultra-trace levels. Serving this need is not trivial. Investigated materials may be derived from every conceivable source: naturally occurring specimens of atmospheric, biological or geological origin; man-made substances ranging from artifacts to industrial wastes; newly synthesized compounds and heterogeneous substances of organic and inorganic makeup. Compounding the complexity is the fact that the chemical diversity of the elements must be considered, since the breadth of research in TAMUS touches all corners of the periodic table. Fields of research that would benefit include: chemical technologies (e.g., functionalized polymers, metal-organic frameworks, quantum dots); environmental studies (e.g., biomonitoring, air particulates, waste water management); human health (e.g., genetics, metabolism, drug discovery). The Elemental Analysis Laboratory (EAL) in the Department of Chemistry presently combines facilities and expertise in quantitative elemental characterization techniques (NAA and ICP-MS) and is internationally recognized for its unique capabilities. The EAL already provides access and training to >50 research groups in >20 departments across several colleges and institutes at TAMU, as well as, numerous external organizations around the world. The EAL has a strong record in leveraging funding from private industry with over \$1M in contract work over the past 5 years including significant contracts with Shell, Chevron, and Sandia National Lab, among others. We expect improved facilities to increase external funding opportunities and allow TAMU researchers to be more competitive for federal grants. The addition of selected tools, including ICP-OES and inert gas fusion analysis, will expand the breadth and depth of analysis capabilities. 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. Experience with many users at the EAL has taught that bad measurements are too easily made with advanced instrumentation, simply because of improper sample handling or an inadequate preparation environment. Upgrades of laboratory infrastructure, including contamination-free workspaces and clean-room grade fume hoods, will provide researchers University-wide with access to excellent sample preparation facilities. Just as importantly, facility users will receive the necessary training for their proper use. New trace analysis workspaces 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. The training to perform sample preparation work will benefit students in their work at TAMU and will provide them with desirable skills in industry.