Cover page (1 page)

Research Development Fund – SPRING 2019

Application Title: **"New Solid-State NMR Spectrometer with Enhanced Capabilities"**

Lead contact for RDF Application:

Dr. Janet Bluemel
Department of Chemistry
Email: bluemel@tamu.edu
Phone: (979)845-7749

Key Participating Units: College of Science, College of Engineering

Anticipated Request Amount ($): $794,249

Executive summary of this application to utilize Research Development Funds:

With this application we aim at replacing a 15 year old solid-state NMR spectrometer by a new spectrometer with enhanced capabilities. The targeted 400 MHz solid-state NMR spectrometer will allow faster Magic Angle Spinning (MAS) of the samples. Rotating a solid sample faster leads to fewer line-broadening interactions and better signal resolution. The sensitivity of the measurements is increased additionally due to the new probehead technology, and the measurement times are shorter, allowing for more samples to be studied within a given time period. Studies of difficult samples incorporating quadrupolar nuclei or paramagnetic components would be facilitated with the new spectrometer, substantially widening the applicability of the method and the user base.

All research universities have a solution NMR facility. However, what distinguishes Texas A&M University from others is that it has both a solid-state NMR spectrometer and the exceptional expertise to operate it at the highest level and analyze the results. This expertise is firmly rooted within the NMR facility of the Chemistry Department, and many faculty and graduate students are knowledgeable users.

Being a fundamental analytical method, many groups at Texas A&M rely heavily on solid-state NMR spectroscopy. Researchers in the large Colleges of Science and Engineering are anticipated to be the main users of the new instrument. Many faculty have been attracted to Texas A&M and subsequently obtained large extramural research grants because of the solid-state NMR capability. It allows undergraduate and graduate students, as well as postdocs and visiting scholars to pursue cutting-edge research and write publications for the highest-impact journals. For example, the Inorganic Chemistry Division of Texas A&M is ranking on place 5 worldwide, and the solid-state NMR capability is surely one factor.

Unfortunately, due to heavy use and old age, the existing spectrometer is no longer reliable and has to be replaced. We want to pursue the opportunity and purchase a spectrometer with significantly enhanced capabilities. The new instrument will widen the user base, lead to a larger number of applicable projects and will further increase our ability to attract extramural funding from federal and private sources. This new solid-state NMR spectrometer will distinguish our NMR facility from comparable institutions and enhance the outside visibility of the Department of Chemistry and Texas A&M in general.