

Research Development Fund – Fall 2017 Application

Application Title: Integration, Coordination and Upgrade of Optical Microscopy Resources in TAMU Shared-use Microscopy Facilities: The Image Analysis Laboratory (IAL) and Microscopy and Imaging Center (MIC)

Lead contact for RDF Application:

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Key Team Members: *Image Analysis Laboratory:* Robert C. Burghardt, Rola Mouneimne; *Microscopy and Imaging Center:* Kristen Maitland, Stanislav Vitha AND current IAL and MIC PIs

Key Participating Units: Colleges of Engineering, Agriculture and Life Sciences, Education and Human Development, Medicine, School of Public Health, Science, Veterinary Medicine

Anticipated Request: \$1,982,000

Executive summary: This application is focused on improving and integrating shared optical microscopy technologies at BSL-2 essential for life-science researchers on the Texas A&M University campus. These facilities are housed within the IAL (located in the Vet Med Administration Building) and MIC (located in the Interdisciplinary Life Sciences Building). MIC and IAL provide critical life sciences microscopy resources required by TAMU as well as non-TAMU system PIs that support the use of advanced imaging technologies for life sciences research at the nanoscale to millimeter scale. During the past year, the IAL and the MIC together have supported advanced optical and electron microscopy needs of over 230 PIs. To further enhance research and graduate education performed in these facilities, we are requesting equipment: (1) to provide a common updated platform for conventional optical microscopy (Zeiss Axio Imager 2 Microscopes with brightfield, darkfield, phase, DIC, and fluorescence for both IAL and MIC). (2) to increase high-throughput capability with a robotic platform for live cell imaging (Zeiss Celldiscoverer 7, IAL). (3) to add a light sheet selective plane illumination imaging system (Alpha3 Light Sheet Microscope). (4) to improve resolution, speed, scan size, and time lapse acquisition with a new confocal microscope (MIC). (5) to enhance biological high resolution imaging by adding Airyscan detection to an existing IAL Zeiss 780 multiphoton microscope. (6) to enhance superresolution capability with a stimulated emission depletion add-on (Aberrior Instruments STEDYCON). (7) to add necessary 3D image analysis software. (8) to add cell culture facilities and upgrade instrument rooms in the MIC to Biosafety Level 2. These tools will expand capabilities of both facilities, enhance the coordination and availability of advanced imaging tools, enable training of students through formal graduate courses that employ these tools, and expand the campus locations where BSL-2 safety level live cell imaging can be performed. The requested instruments and equipment upgrades will be integrated into the existing IAL and MIC cores where the existing facilities infrastructure is already in place as well as the expertise to ensure access to and maintenance of these tools. Further, the facilities will be available to a wide user base across Colleges of Engineering, Agriculture and Life Sciences, Education and Human Development, Medicine, School of Public Health, Science, Veterinary Medicine. As advanced imaging resources are critical to many individual investigator grants and have been successfully integrated into NIH shared instrumentation grants, NIEHS-funded Center and Superfund Grants, these upgrades will further enhance campus competitiveness for new funding opportunities for interdisciplinary research.