

## EQUIPMENT

### DEITERS LABORATORY:

Equipment for molecular biology work in the Deiters lab includes two 37 °C shakers, three 37 °C incubators, four Eppendorf microcentrifuges, one Thermo Legend X1R tabletop centrifuge, one Sorvall Lynx 6000 floor centrifuge, three Bio-Rad T100 PCR thermocyclers, one Bio-Rad T1000 CFX96 qRT PCR thermocycler, one Bio-Rad ChemiDoc MP imaging system, one Bio-Rad GenePulse Xcell electroporator, one Nanodrop spectrophotometer, and several gel boxes with power supplies. Two fully equipped Tecan M1000 plate-readers and one Tecan M200 plate-reader are available and can perform a wide range absorbance, fluorescence, and luminescence assay. Equipment for cell biological work includes two 6-foot biosafety cabinets; three Forma II CO<sub>2</sub> incubators; and a Zeiss AxioObserver Z1 inverted epifluorescent microscope equipped with a CCD camera, a Tokai Hit WSKM Stage Top Incubator, and an Ametek TMC CleanBench vibration isolation table. Two -80 °C and two -20 °C freezers are available for storage of organic compounds, DNA/RNA, and bacterial cells. Two liquid nitrogen dewars with temperature monitors are available for long-term storage of mammalian cells.

Equipment for chemical synthesis includes fifteen 5-foot fume hoods, six 3-foot fume hoods, synthetic chemistry glassware, rotary evaporators equipped with Thermo Scientific ThermoChill II Recirculating Chillers, vacuum pumps, balances, two drying ovens, four refrigerators/freezers, a Teledyne Isco CombiFlash Rf automated flash chromatography systems, an Agilent 1200 HPLC system, and a Shimadzu LC20 HPLC system. Three CEM Discover microwave synthesizers are available for microwave-mediated chemistry. An ABI 394 DNA/RNA synthesizer and a SpeedVac are used for oligonucleotide syntheses.

*Major equipment relevant for this research is available within the Department of Chemistry at the University of Pittsburgh in the same building as the Deiters laboratory:*

The department mass spectrometry facility houses six instruments, including a Bruker ultrafleXtreme MALDI-TOF mass spectrometer, a Micromass Ultima Q-TOF API, a Thermo Scientific Q-Exactive Orbitrap, and a Shimadzu LCMS system available for walk-on student use. The chemistry department NMR facility has seven Bruker spectrometers (two 300 MHz, two 400 MHz, a 500 MHz, a 600 MHz, and a 700 MHz). Each magnet is equipped with a state-of-the-art console capable of automated tuning, locking, and shimming. A 300 MHz, 400 MHz, and 500 MHz instrument comes equipped with a Bruker SampleXpress Lite autosampler for high-throughput automated data acquisition, and the 700 MHz instrument has microprobe capabilities that can enhance sensitivity for low-concentration samples. A Horiba/Jobin-YvonFluoroMax 3 Fluorescence Spectrophotometer, a VeecoNanoscope III atomic force microscope, a Brookhaven 90 Dynamic Light Scattering Spectrometer, and a Wyatt DAWN EOS Multi-Angle Light Scattering Spectrometer are open for shared use in the department's Materials Characterization Lab. Autoclaves, incubators, centrifuges, a tissue culture hood, and ancillary equipment related to bacterial and mammalian cell culture are available in the shared departmental Biological Instrument Cluster, which is managed by a PhD-level scientist (Dr. Gillespie).

*Major equipment relevant to this research is available at the Biomedical Science Tower 3, only four blocks from the Department of Chemistry:*

We routinely use the Biomedical Mass Spectrometry Center at the University of Pittsburgh for a wide range of proteomics needs, including protein identification analysis via tryptic digests, sensitive liquid chromatography tandem mass spectrometry (LC-MS/MS), and reassembly the identified peptides into proteins. The BioMS facility is equipped with two ThermoFisher LTQ XL linear ion trap mass spectrometers, one ThermoFisher LTQ XL linear ion trap mass spectrometer with a multiplexed LC interface, two ThermoFisher triple stage quadrupole (Ultra and Quantiva) mass spectrometers, two ThermoFisher LTQ Orbitrap mass spectrometers (Velos and XL), ThermoFisher LTQ Velos Orbitrap with ETD, a Bruker microTOF ESI-TOF with HPLC, and several MALDI mass spectrometers (not relevant for this research). The facility is led by Dr. Yates and supported by three PhD-level scientists (Drs. Zeng, Wendell, and Mullett) and six technicians.

### WEBER LABORATORY:

Equipment for the superfusion system includes a Watson-Marlow Sci-Q 400DM2 two-channel peristaltic pump, Warner Instruments SH-27B inline solution heater with TC-324B temperature controller, Living Systems Instrumentation OX miniature gas exchange oxygenator, Dwyer Instruments OMA-1 gas flowmeter, and a Unisense OX-25 oxygen sensor with a BASi LC-4C amperometric detector connected to a National

Instruments NI USB-6008 digital logger. Imaging is done with a Leica TCS SP5 II Broadband Confocal Microscope equipped with an HCX PL FLUOTAR 5x objective (N.A. = 0.15) and an HCX APO L U-V-I water immersion 63x objective (N.A. = 0.90). To prepare primary cells for culture, a dedicated Baker Edgeguard Lamina Hood with a stereomicroscope equipped with all necessary surgical instruments is available for animal surgery. Two biological safety cabinets (Heraeus Herasafe and Nuair) are available for cell culture, along with two VWR CryoPro liquid nitrogen cell storage dewars and two dedicated HeraCell CO<sub>2</sub> incubators. This equipment is located in the Department's Biological Instrument Cluster, which is managed by a PhD research scientist. This equipment is available in a secured BSL2 laboratory adjacent to a space with autoclaves, a -80 °C freezer, and additional equipment for bacterial and mammalian cell culture.

#### **WANG LABORATORY:**

Equipment for the preparation and purification of biomaterials in the Wang lab includes four Schlenk lines, a Carver press, a Biotage Isolera One automated flash purification system, three NE-1000 syringe pumps, a Labconco Freezone 4.5 freeze dryer, a Blue M vacuum oven, a Tousimis SAMDRI-PVT-3B critical point dryer, an Eppendorf 5417 C centrifuge, two ES30P-5W high voltage power supplies, and a MasterFlex 8-channel water-resistant peristaltic pump with remote digital controller. An MBraun Unilab inert atmosphere glovebox is available for work in the exclusion of oxygen and moisture. For characterization of biomaterials, equipment includes a Malvern Viscotek GPCmax with RI and RALS detector, Malvern Zetasizer Nano ZS90, Nicolet iS10 FTIR spectroscope, Robbins Model 2000 Hybridization Incubator, BioTek Synergy MX microplate reader, Keyence laser micrometer and camera, an MTS Insight Mechanical Analyzer with Bionix Envirobath, and a Nikon TiE motorized inverted microscope for DIC and fluorescence imaging with Retiga-SRV digital camera. Equipment for cell culture includes a Sanjo MCO18AICUV air-jacketed incubator, four Thermo HeraCell air-jacketed incubators, and a Locator 4 liquid nitrogen cell storage tank with liquid nitrogen level monitor.

*Major equipment relevant for this research is available within the Center for Biologic Imaging (CBI) at the University of Pittsburgh in the South Biomedical Science Tower 2 blocks away:*

We maintain an active collaboration with the CBI, which allows us to reserve time on a Leica TCS NT Confocal Microscope (inverted), a Leica TCS-SL Confocal Microscope (upright), one of three Olympus FV1000 Confocal Microscopes (inverted), an Olympus FV500 Confocal Microscope (upright), a Zeiss 510 Meta Confocal Microscope (inverted), a Perkin Elmer Spinning Disk Confocal Microscope (inverted), an Olympus DSU Spinning Disk Confocal Microscope (inverted), a Noran OZ (retrofitted to PC platform) Confocal Microscope (inverted), a Nikon Sweptfield confocal microscope (TSI inverted), one of two Optiscan Confocal Endoscope/Microscopes, an Olympus FluoView MPE Multiphoton Microscope, one of three Multimode microscopes (Automated XY, Ratioing, FRET; two of which have microinjection capabilities), one of two Multimode Widefield/TIRF microscopes (one with microinjection capabilities), an Olympus Multimode (3D, 2D fluorescence, high speed) dissecting microscope, an Olympus SXZ12 Dissecting Microscope, an Olympus SXZ-ILLD100 Dissecting Microscope, an Olympus BX51 light microscope (Brightfield, darkfield, epifluorescence DIC), one of two Olympus Provis light microscopes (Brightfield, darkfield, epifluorescence DIC), a Nikon Eclipse 800 microscope (Brightfield, darkfield, epifluorescence DIC), one of two Nikon FX Series microscopes (Brightfield, darkfield, epifluorescence DIC), a JEOL 1011CX Transmission Electron microscope with high resolution AMT digital camera, a JEOL 1210 Transmission Electron microscope with high resolution AMT digital camera, and a JEOL 9335 Field Emission Gun SEM with backscatter detector.

*The following equipment is available for surgery and hemodynamic measurements via the Vascular Medicine Institute (VMI) Cardiopulmonary Phenotyping Core 2 blocks from my lab:*

An Ohmeda Isotec 2 Anesthetic Vaporizer, Hugo Sacks Murine Mini Vent, two Kent Scientific Genie Plus Infusion Systems, a World Precision Instruments Operating Microscope, Geiger Thermal Cautery Units, a Scisense Advantage Derived Volume/Pressure Measurement System, two Scisense Mouse Pressure Catheters, a Doppler Signal Processor 200 ([www.instruments.com](http://www.instruments.com)), two dedicated Dell computers for data acquisition and analysis, and a Moore Instruments LDI2 laser doppler system for tissue and arterial blood flow analysis are available at the VMI.