CDDI Instrumentation and Software

V071714. For information, visit the CDDI website.

Autoclaves

- **STERIS AMSCO Lab250**
- **Hirayama HV-50**

Balances

- **Mettler MX5** - to 5.1 g/1 ug
- **Mettler AB104-S/FACT** - to 110 g/0.1 mg
- **Mettler Toledo MS204S** - 220g/0.1 mg
- **Scout Pro SP401** - 400g/0.1 g
- **Mettler Toledo PL 30001** - 3.1 kg/0.1 g
- **Denver Instruments SI-602** - 600 g/0.01 g

Cell culture - mammalian cells, yeast/fungi and bacteria - to biosafety level 2

- **New Brunswick Scientific I26 refrigerated Incubator Shaker**
- **New Brunswick Scientific Excella E24 Shaker**
- **New Brunswick Scientific BioFlo310 Fermentor** - 2.5 and 14 liter flasks, for recombinant protein expression (~ 0.5 mg to > 6 g expressed protein/run)
- **Incubators** - microbiological and CO_2
- **Biosafety cabinets** for sterile culture and sample processing/packaging to BSL-2
- **Phase contrast microscopes**

Cell lysis and extraction

- **Thermo French Pressure Cell Press** – bacteria lysis for recombinant protein expression
- **Misonix 4000 sonicator** with microtip
- **Cole Parmer Ultrasonic processor** with microtip
- **Cole Parmer Lab Gen 125 tissue homogenizer**

Cell and sample storage

- **Thermo CryoPlus 1** – long-term liquid nitrogen storage for mammalian cells
- **Revco Ultima II** storage of cells and samples to -86°C
- **Thermmax walk-in cold room** sample storage to -20°C

Centrifuges

- **Sorvall RC6 high speed centrifuge** – SS34, SLA1500, other rotors (to 4 x 1000 ml)
- **Sorvall WX ultracentrifuge** - Surespin 630 (17 & 36 ml buckets) and T8100 rotors

Chemical synthesis

- **Anton Paar Monowave 300 microwave reactor** – for rapid, controlled synthesis
- **Innovative Technology Pure Solv solvent purification system** - removes residual water from organic solvents (chroroform, tetrahydrofuran, toluene and acetonitrile) prior to the performance of moisture-sensitive reactions under inert atmospheres (nitrogen/argon)

Chromatography (HPLC/FPLC/MPLC), separation and solvent purification

- **Thermo High-Flow Surveyor LC/HPLC** with PDA Plus detector
- **GE Healthcare AKTApurifier** - equipped with SEC, ion exchange, desalting and GST-/Niaffinity columns; Superloops for large sample loading (HPLC/FPLC)
- **Bio-Rad DuoFlow Pathfinder FPLC System**
- **Shimadzu semi-preparative HPLC** (1 - 10 ml/min flow rate, 1-100 mg sample loading) for sample fractionation and purification
- **Teledyne-Isco Torrent MPLC** – for large scale chromatographic separation (0.5 g – 300 g sample capability)

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- **Teledyne-Isco Rf200i (ELSD integrated) MPLC** - for UV and non-UV active sample separation (10 mg - 33 g sample capability; located in USF Bioscience facility)
- **Innovative Technology solvent purification system** - removes residual water from organic solvents (chroroform, tetrahydrofuran, toluene and acetonitrile) prior to the performance of moisture-sensitive reactions under inert atmospheres (nitrogen/argon)

Drying and sample concentration

- **Thermo SPD 131DDA SpeedVac concentrator** with vapor trap
- **Labconco FreeZone 4.5 L lyophilizer**
- **VirTis GPFD 36DX66 general purpose freeze dryer** - multi-shelf; 35 L capacity (to -53°C)
- **Heidolph Hei-Vap Precision Model G3 rotary evaporator system** with rotachiller and vacuum pump (to 7 mbar)
- **Supelco Visiprep 24 drying manifold**

Electroporation

- **Harvard BTX ECM 830 Electro Square Porator** for transforming bacteria, *in vivo* drug/gene/plasmid delivery applications
- **Aditus CythorLab (ZOK impedance)** - *in vitro/vivo* drug and gene delivery

Flow cytometry and cell sorting

- **BD FACSAria II** - flow cytometer/sorter (Biosafety Level 2 sorting and analysis capability)
- **BD FACSCanto II** - analytical flow cytometer (single tube and 96-well plates)

High-throughput screening and liquid handling

- **Tecan Mdl EVO 150 automated workstation (96 channel arm , 8-span, gripper)** – for pharmacokinetic, solubility and antimicrobials/chemotherapeutics testing of drug candidates
- **BioTek ELx50 plate washer** for routine 96-well plate assays
- **Bioscreen C Microbiological Growth Curve Analyzer** Up to 200 growth curves simultaneously
- **BioRad Plex 200 (Luminex)** XMap Technology system, for single and multiplexed immunological (e.g., ELISA-like assays) and molecular biology based assays

Image acquisition and analysis – for agarose and PAGE gels, films, etc.

- **BioRad Pharos FX**
- **BioRad ChemiDoc XRS**
- **BioRad GS-800 calibrated densitometer**
- **Fotodyne FOTO/Analyst Imaging system** with transilluminator

Mass spectrometers and software

LC-MS Platforms

- **Hybrid linear ion trap-Orbitrap (LTQ Orbitrap XL, Thermo)** nLC/MS
  - High-throughput Proteomics Platform
  - Accurate Mass Measurement (< 5 ppm)
  - Relative Quantitation (SILAC)
  - Posttranslational Modifications
  - Recombinant Protein Molecular Weight
  - Large Scale Proteomic Experiments

- **Linear ion trap (LTQ XL, Thermo)** nLC/MS
  - High-throughput Proteomics Platform
  - Gel-Band Protein Identification
  - Spectral Counting Relative Quantitation
  - Project Development Samples
  - MSn Analysis of Small Molecules

- **Triple quadrupole (TSQ Quantum Ultra, Thermo)** nLC or LC/MS
  - High-throughput Targeted MS Experiments
  - Targeted nLC Quantitation of Diagnostic Proteins/Peptides

- High-Throughput Targeted MS Experiments
- Targeted quantitation of small molecules
- Project Development Samples

- **Hybrid Quadrupole-Orbitrap (Q Exactive Plus, Thermo)** nUPLC/MS
  - High-throughput Proteomics/Metabolomics Platform
  - Multiplexing up to 10 precursors per scan (iTRAQ)
  - UPLC for improved peak resolution and higher throughput
  - Mass accuracy to < 3 ppm

- **Agilent 6120B LC/MS single quadrupole mass spectrometer -** for high throughput mass determination, separation and sample collection.

GC-MS Platform

- **Agilent 7890A GC/7200 Time-of-Flight mass spectrometer (GC/MS Q-TOF EI/CI)** – for high resolution and accurate mass measurements of small molecules (< 500 amu) using EI, PCI and NCI.

MS software

- **Proteomics workflow** - MASCOT, MaxQuant, Bioworks, Scaffold 4.3.4, Ingenuity Pathway Analysis
- **Small molecule workflow** - Chemstation and Mass Hunter

Microscopy, image capture and analysis

- **Zeiss Axiovert 100 deconvolution microscope** for cell imaging and content analysis
- **Leica LMD 6000 laser microdissection microscope** for cell imaging, content analysis, and sampling capability for downstream applications (MS, PCR, live cell harvest, e.g.)
- **Leica MZ6 stereo/dissecting microscope**
- **Leica DM2000 compound microscope** - with EL6000 External Light Source for fluorescence microscopy; epifluorescence capable
- **Leica DM IL HC inverted microscope** – with IMC, EL6000 External Light Source
- **Nikon Biostation IM-Q** - for long-term time-lapse imaging (days to weeks) at high resolution in a constant environment. Motorized z with a minimum of 50nm resolution for stacks, two channels of fluorescence, LED lighting for phase illumination.
- **PerkinElmer Operetta** - high content microscopy imaging system, for slide and multiwall plate image acquisition and analysis (brighfield/fluorescence/confocal)
- **MediaCybernetics ImagePro Plus V. 6.2 software** – count, measure/classify objects; automate analyses

Molecular biology

- **Agilent 2100 Bioanalyzer** microfluidics-based platform for sizing, quantification and quality control of DNA, RNA, proteins and cells
- **Applied Biosystems 3130 Genetic Analyzer** for *de novo* sequencing, sequencing, comparative sequencing, mutation/heterozygote detection, SAGE™, SNP validation and screening, genotyping, microsatellite analysis, AFLP® analysis, LOH and conformational analysis
- **Applied Biosystems 7900HT Fast Real-Time PCR System** real-time quantitative PCR system that combines 384-well plate compatibility with fully automated robotic loading, optional Fast real-time PCR capability

NMR

- **Agilent VNMRS 600 and 800 MHz digital superconducting magnet systems** with digital acquisition control systems, Dell workstations running Linux, VT control units, HCN triple resonance cold probes and HCN room temperature probes. Capabilities include the determination of protein structure at atomic resolution, characterization and structure elucidation of small molecules (e.g. synthetic molecules, natural products, and small peptides, etc.) and determining protein-protein/ligand interactions for drug screening, e.g. The instruments are capable of characterizing the structure and dynamics of biological macromolecules up to 100 kDa in size.

Spectrophotometers and plate readers

- **Tecan Infinite M-1000 Pro multimode plate reader** – with Premium Quad4 monochromator technology; excitation/emission, absorbance, top read fluorescence, bottom read fluorescence, luminescence, fluorescence polarization
- **BioTek SLFA plate reader** -uv/vis, fluorescence, luminescence; incubate/shake/kinetics
- **Thermo Nanodrop 1000 spectrophotometer**

- **Thermo Nanodrop 3300 fluorospectrometer**
- **Agilent Cary 630 FTIR spectrometer** for IR spectra of pure compounds using KBr diamond module (solid, liquid and oil) or transmission module. ZnSe liquid cell for low volume samples.
- **Agilent Cary 60 UV spectrometer –** UV absorbance measurements using quartz cuvette (10 mm) or fiber optics

Surface cleaning, materials deposition and analysis

- **Q-Sense E4 Quartz Crystal Microbalance** - with dissipation monitoring (QCM-D), for e.g., mass determination (pg/cm2), protein-protein interactions, biofilm and surfactant analysis, layer thickness and viscoelastic property determinations of materials
- **Cambridge Nanotech Savannah 100 atomic layer deposition instrument –** deposition of metal oxides on various surfaces
- **Laurell Tech Spin Coater**
- **Aerotech, Inc. linear stage** - controlled blade coating, e.g.
- **Newport linear and rotary positioning stages** - with ESP motion controller
- **BioForce Nanosciences UVO Procleaner –** surface cleaning device
- **KSV CAM 100 Contact angle instrument (optical goniometer)** - with heated stage

Water purification

- **Barnstead Epure** - produces type I research grade water