

Facilities and Resources

The ISBC conducts protein expression, purification, analysis and X-ray structure determination. The facilities occupy two 740 sq. ft. laboratories (016A and 016B) in the basement of the Interdisciplinary Science Building (ISB). The latter are connected by an internal pass-through entrance. The labs are equipped with house chilled water, DI water, compressed air, vacuum and natural gas, multiple static internet ports, and adequate air handling and temperature control to maintain a constant ambient temperature of 68 °F. ISB 016A is accessed from a central corridor via a secure keypad entrance. This laboratory is dedicated to crystallization and crystallographic data collection. It is equipped with a chemical fume hood, one laboratory island and a wall-mounted bench space to accommodate crystallization robotics and microscopes, and for crystal mounting and freezing operations. ISB 016A houses constant temperature incubators for crystal storage, and two X-ray diffractometers (Rigaku MicroMax 007 and Bruker Venture D8). There are two workspaces for operation of the diffractometers and a dedicated workstation for small-molecule data workup. The room houses two Haskris chilled water recirculators used to cool the sealed tube X-ray generator (Bruker) and rotating anode (Rigaku).

The Biochemistry laboratory (ISB 016B) is located interior to 016A and has an attached 200 sq ft. tissue culture room (ISB 016C). ISB 016B harbors two fixed laboratory islands, each serviced with gas, air and vacuum and elevated adjustable shelves and under-counter cabinets. One of the islands is equipped with a large double sink at bench-end. A plumbed area accommodates an ice-maker. The lab also harbors a wall-mounted bench with enclosed upper and lower cabinets and a wall-mounted desk space that accommodates three workspaces equipped with stable internet ports. The tissue culture (TC) room (ISB016C) is attached to ISB016B via a secured doorway. The positive pressure TC room harbors a wall-mounted bench with a DI water-equipped sink and adequate wall space to accommodate a 6'5" Biosafety cabinet, stacked incubator shakers, two 37° CO2 incubators, a refrigerator, storage shelf and secured CO2 gas cylinders. An 80 sq. ft. Kolpak walk-in 4° C cold room, power and emergency power for the ISBC's -80 freezer, incubator/shakers, cell disrupter, glassware dryer and both medium and high-speed centrifuges are all housed in ISB015, which is adjacent to 016A and 016B and is accessible to the latter by an interior door, and to the central hall way via a keyed entry. ISBC's multi-angle light scattering detector, ITC and Bicores-X100 are located on a dedicated bench in ISB 204.

The ISBC manager, Dr. McClelland, occupies a 100 sq ft. office, ISB 220, which houses workstations used for data processing and two internet ports. The data processing workstation is connected to a network file sharing system operated by the Molecular Computation Core Facility that also affords secure high-speed remote access to remote clients, specifically, computational and data storage facilities at national synchrotron beamlines. The manager of the Small Molecule X-ray Diffraction Core occupies disk space and computer workstation facilities in ISB 016A. The ISBC Director, Dr. Bowler, occupies a 120 sq ft. office in the Chemistry Building equipped with a PC workstation, printer and internet ports.

The ISBC houses the following equipment:

Macromolecular crystallization, X-ray data collection [ISB 016A]

- Rigaku MicroMax 007HF X-ray generator inverted phi axis, VariMax HighFlux optics and Dectris 2000 CMOS detector
- Oxford liquid nitrogen crystal cryo-cooling system with auto refill
- Formulatrix NT8 Drop Setter for rapid preparation of crystallization screening plates
- RockImager 360 crystallization robot, temperature-controlled crystal hotel and UV-fluorescence/Visible crystal imaging system
- Art Robbins SCORPION matrix maker and JANSi UV and Olympus microscopes for crystal viewing and documentation
- ThermoFisher Vitrobot™ Mark IV Vitrification Robot for preparation of cryo-EM grids
- Zeiss STEMI SV8 stereomicroscope for crystal mounting
- Custom SSRL foam dewar and SSRL cassette or Uni-Pucks for freezing and storage of cryoprotected crystals for robotic data collection
- Two MVE-SC4/2V dry nitrogen insulated cryo shippers for crystal transport to synchrotron facilities
- 2 low-vibration incubators for storage of crystallization experiments
- Crystallization kits, including Hampton, JCSG, Wizard Suites

- Two DELL workstations, installed with current crystallographic software suites, are available for in-house and remote diffraction data processing and structure determination in ISB 220
- XDS, HKL2000 and Rigaku Crystals software for data processing and scaling
- CCP4, PHENIX, CNS, COOT, and PYMOL software packages for X-ray diffraction data reduction and crystal structure determination and visualization
- ATLAS software package for small-angle scattering data analysis

General laboratory equipment (ISB 015 and 016B)

- Thermo Scientific Barnsted NanoPure water purification system
- Beckman Coulter Optima XE-90 ultracentrifuge with 2 Beckman Coulter Ti45 rotors
- Sorvall RC6+ Floor centrifuge with Fiberlite F10 4x10000 LEX and Fiberlite F21-8x50Y rotors
- Sorvall RT7 bench-top centrifuge
- BenchMark bench-top incubator/shaker
- LabNet PrismR benchtop refrigerated microcentrifuge
- Thermo Scientific Legend Macro 21 PCR cycler
- 3-door 4°C Deli fridge
- Three 4°C laboratory refrigerators (one dedicated to ISB016C)
- -20°C laboratory freezer
- VWR -80°C laboratory freezer

Bacterial Protein Expression [ISB 015, 016B]

- Two stacked Innova 4430 refrigerated floor shakers for bacterial growth
- Barnstead/Labline MaxQ/400 and benchtop orbital shaker
- Brunswick Bioflo/Celligen 115 fermenter with Eppendorf 7L vessel and Thermoflex 1400 recirculating water bath
- Thermo Fisher Isotemp incubator for bacterial growth

Eukaryotic Cell Protein Expression [ISB 016B, 016C]

- SterilGard III Advance Class II Biosafety Cabinet
- Two stackable Innova 4430 temperature-controlled incubator shakers for maintenance and scale-up insect cell growth
- Thermo Forma Direct Heart CO2 Incubator with HEPA filter for batch mammalian cell culture, equipped with orbital shakers
- Thermo Forma MIDI 40 temperature controlled CO2 incubator for mammalian cell passaging
- Nikon Eclipse Ti-SM inverted microscope
- Left Technology Countess II cell counter
- Binder Drying Oven for baking sterilized culture flask

Protein Purification [ISB 015 cold room, 016B]

- 2 GE AKTA-Pure fast performance Chromatography System for high-throughput protein purification
 - 1 Shimadzu RF-20Axs Prominence fluorescence detector
- Avestin Emulsiflex C5 High Pressure Homogenizer for cell lysis
- Large collection of commercial pre-packed and in-house packed affinity, ion-exchange, hydrophobic interaction and size-exclusion chromatographic columns

Protein characterization [ISB 016B and ISB 204]

- Microcal VP-ITC Calorimeter for determination of binding constants of protein-protein or protein-ligand interactions
- Two BioRad Mini Protean slab gel electrophoresis units with power source
- Thermo Scientific NanoDrop One microspectrophotometer
- Two BioRad Transblot transfer cells for Western blots
- Wyatt TREOS-II multi-angle light scattering detector and Optilab T-rEX Index of Refraction monitor connected in-line to output of Superdex 200 column mounted on an Agilent 1100 series HPLC system

- Biacore X100 surface plasmon resonance detector for protein-ligand binding kinetics and affinity
- Nano-temper Tycho NT.6 thermo-fluorescence detector for determination of protein stability
- Perkin Elmer LS55 luminescence spectrometer