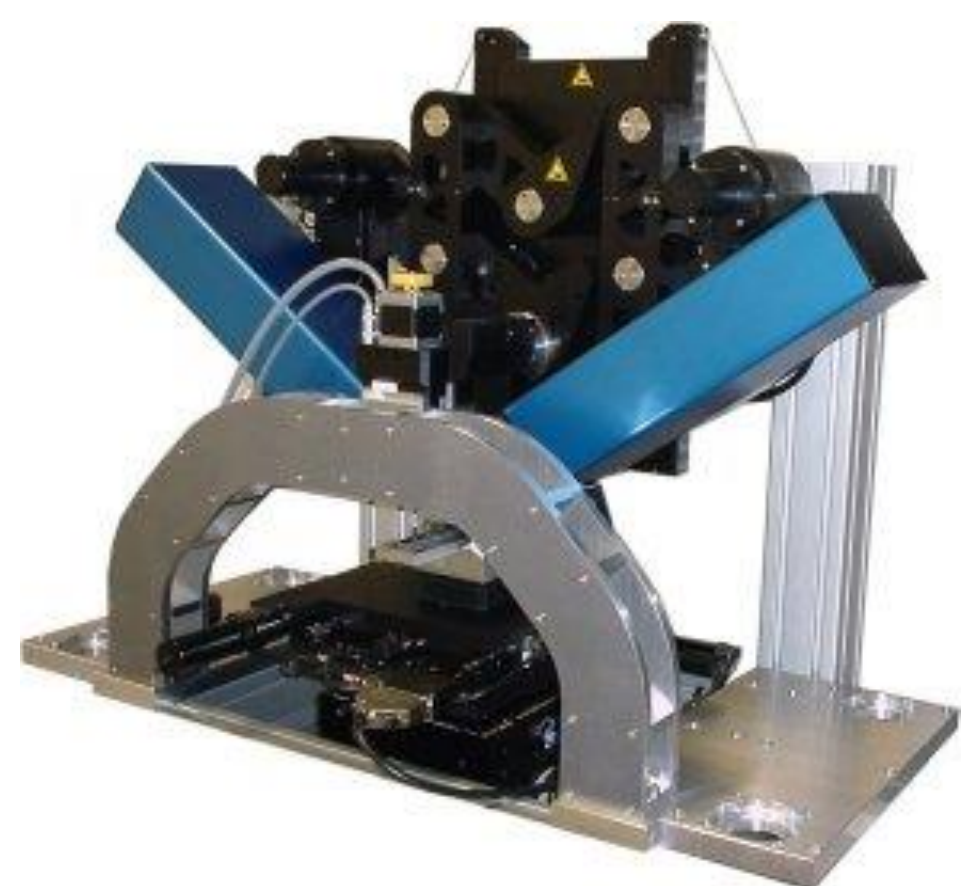


The tools in the NBTC labs have been selected to be of the greatest use to the majority of researchers doing interdisciplinary research in nanobiotechnology and related fields. NBTC staff can train and give experimental advice to any user with an interest in using this equipment.

Materials Characterization



EP3 imaging Ellipsometer

Performs nondestructive thickness measurements of protein, metal, polymer, or ceramic films.

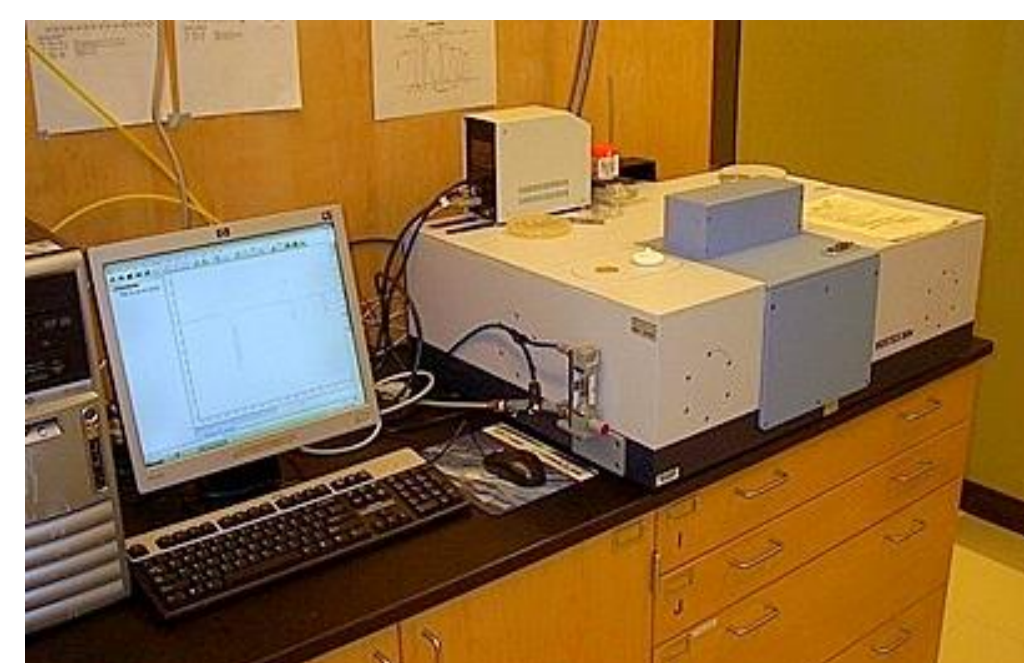
- Sub-Å resolution
- 2µm lateral resolution
- Mapping and kinetics capabilities
- Liquid cell for in situ biological adsorption measurements



Zetasizer Nano-ZS

Dynamic light scattering instrument for measuring the size, size distribution, molecular weight, or zeta potential of nanoparticles, proteins, and polymers.

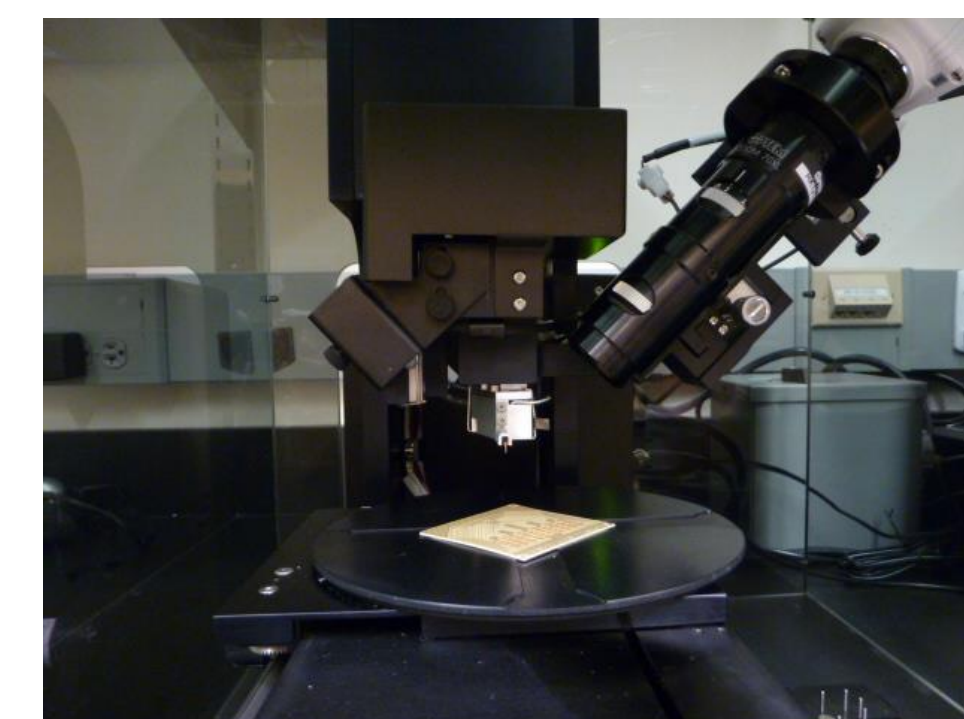
- Measurement range: 0.6-6000 nm.
- Wide functional concentration range



Bruker Vertex 80v FT-IR

Aids in chemical analysis of bulk samples, polymers, or biofilms.

- Vacuum evacuated optics and sample compartment minimize atmospheric water and carbon dioxide peaks, giving greater sensitivity to biologically relevant regions of the IR spectrum.



Dektak 6M Profilometer

Measures heights of troughs or bumps in polymer, metal, silicon, etc.

- Measures step heights anywhere from 10nm to 1mm with Å resolution
- Can perform traces from 50µm to 30mm



Gamry Potentiostat

Microelectrode experiments, electrochemical measurements of organic/biological coatings.

- Readily configurable to user's needs: can be used in conjunction with AFM or microscopy facilities for more detailed characterization of microstructures



SV10 Vibro Viscometer

Measures the viscosity of liquids in ~15 seconds.

- Viscosity range: 0.3-10,000 centipoise
- Minimum sample volume: 10mL or 35ml
- Accuracy: 1% over the whole measurement range



Electronics testing

The NBTC has a variety of electronics testing equipment including voltmeters, ammeters, conductivity meter, multimeters, LCR meter, oscilloscopes, power supplies, source meter, function generators/amplifiers.

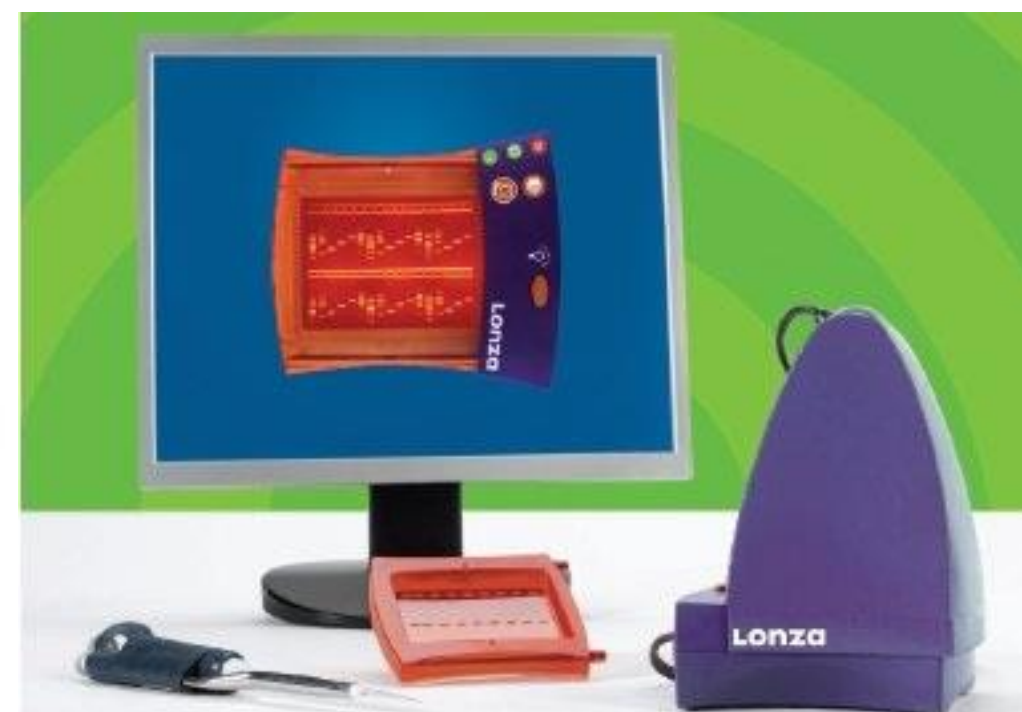
Biological Preparation and Characterization



BioPlex 200

High Throughput Fluidics suspension array system for analyzing concentration of protein and nucleic acid moieties.

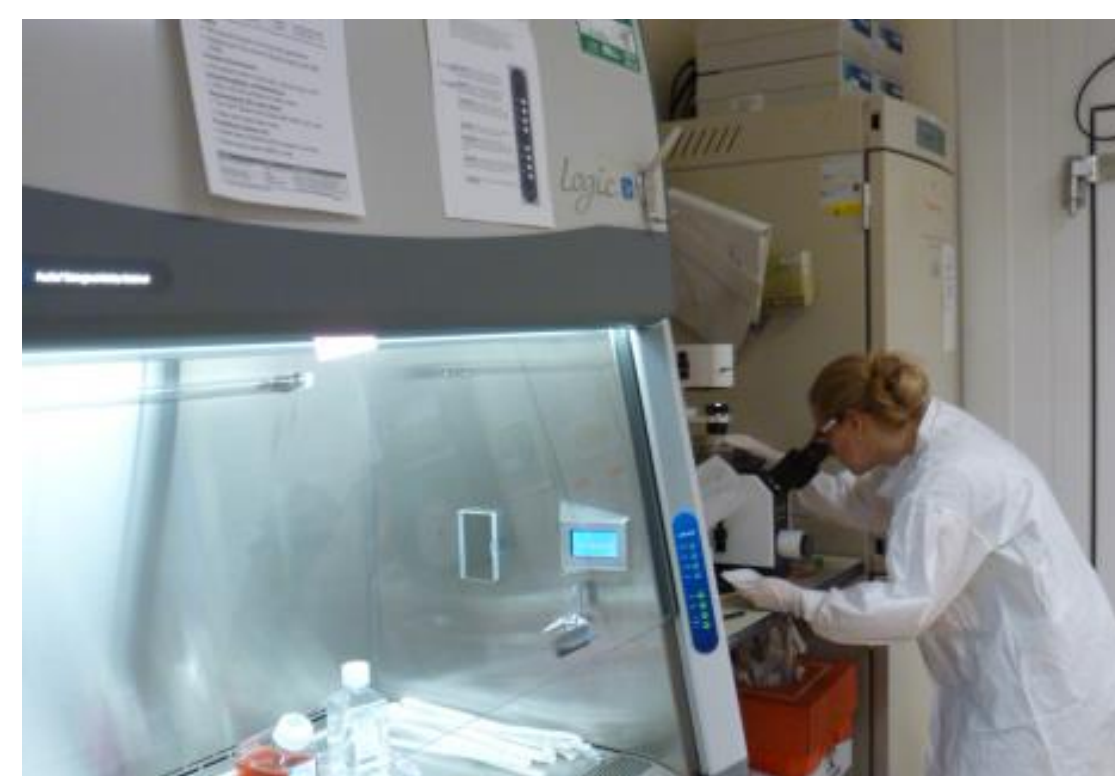
- Fluorescent bead system enables analysis of up to 100 biomolecules in a single sample. 2 μ m lateral resolution
- Automated reading of 96 well plates in about 35 minutes



FlashGel Electrophoresis

System for separating, recovering, and analyzing proteins and DNA.

- See bands in as little as 2 minutes
- 5 - 20 times more sensitive than ethidium bromide; detect <0.1ng DNA or <10ng total RNA
- Built-in transilluminator provides both separation and detection



Mammalian Cell Culture

Complete work station for growing mammalian cells.

- Includes: cell culture hood, incubator with CO₂ control, liquid nitrogen storage tank. Automated Cell Counter, phase contrast microscope, and staff expertise on cell culture, fixation, and staining



Bacterial Cell Culture

Complete work station for growing bacterial cells.

- Equipment includes: cell culture hood for maintaining sterility, rocker water bath, incubator with CO₂ control and orbital shakers, liquid nitrogen storage tank



Fluoroskan

High sensitivity fluorescence plate reader for analyzing fluorescent solutions. Minimum volume 100 μ L

Excitation:
355, 485, 550nm

Emission:
460, 510, 584nm



Turner Fluorometer

Provides analytical quantitative fluorescence measurements in cuvettes

- Sensitivity: 25 pg/ml dsDNA in 2ml assay volume
- Currently available filter pairs:
NB 360 - SC 415, SC 515
NB 490 - SC 585
NB 590 - SC 605



Spectrophotometer

For measuring the absorbance of colored solutions.

- Full spectral range:
- 190 - 1000nm, tunable in 1nm increments with 2nm bandwidth
- Temperature range:
4 - 45° C



PCR Thermocycler

Thermal Cycler for PCR reactions.

- Hot bonnet configuration
- 96 wells for 0.2ml PCR tubes
- Temperature gradient capability

Imaging Capabilities



Nikon TIRF microscope

Total Internal Reflection Fluorescence (TIRF) microscopy is a method for imaging fluorophores located very close to the coverslip, with sufficient sensitivity for single-fluorophore experiments.

- Adaptable to FRET, FRAP, and PALM experiments
- Combine PicoPlus fluid atomic force microscope (AFM) with TIRF or epifluorescence



Rame Hart 500 Goniometer

Measures contact angle or determines the surface energy of a liquid or surface.

- Features: Automated dispensing system and droplet analysis, environmental chamber for heating or cooling



Fluorescence Microscopes

BX51 (upright) and IX71 (inverted) Olympus microscopes can take brightfield or fluorescence images.

- Image Pro software can perform image processing or analysis



PicoPlus AFM

Atomic Force Microscopy (AFM) is a technique for imaging topography or chemical patterns. The PicoPlus AFM can perform this imaging in air, fluid, or controlled atmosphere.

- High-resolution scanner (10 μ m scan range) for molecular scale imaging
- 100 μ m scanner with closed loop
- z positioning for accurate height and force measurements over large scan ranges
- Can be used in conjunction with Nikon TIRF fluorescent microscope for simultaneous force and fluorescent imaging

Materials Synthesis and Preparation



PDMS Processing

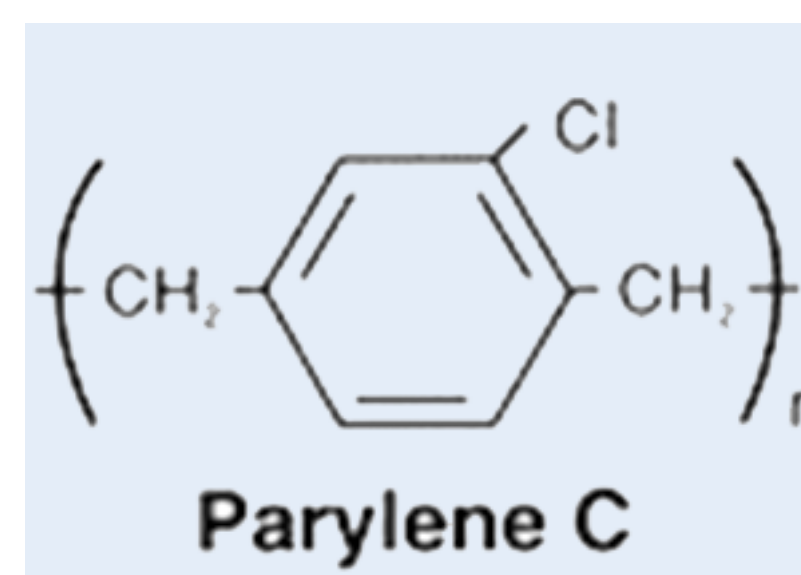
PDMS processing tools:

- 60°C oven
- Vacuum chamber
- Programmable spinner
- UV crosslinker oven
- Plasma cleaner
- Technical assistance



Glove Box

Nitrogen-purged atmosphere enables synthesis of oxygen and water-sensitive materials



Parylene Coating

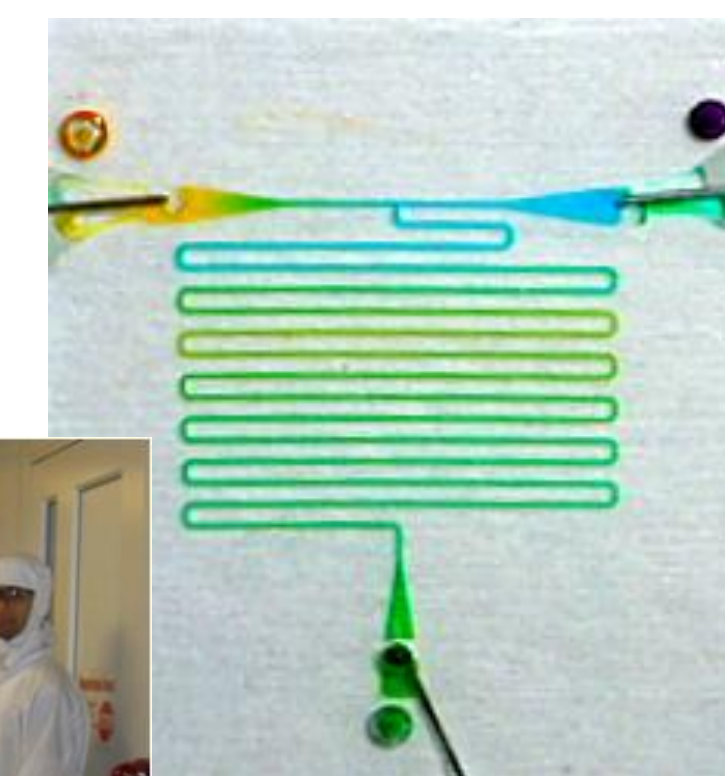
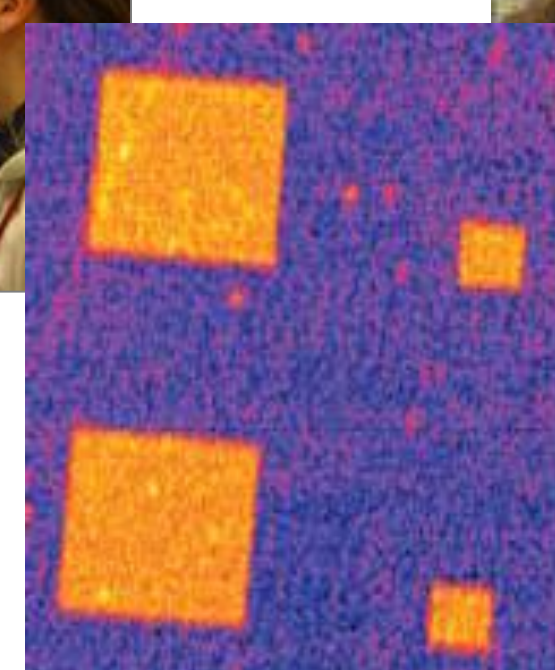
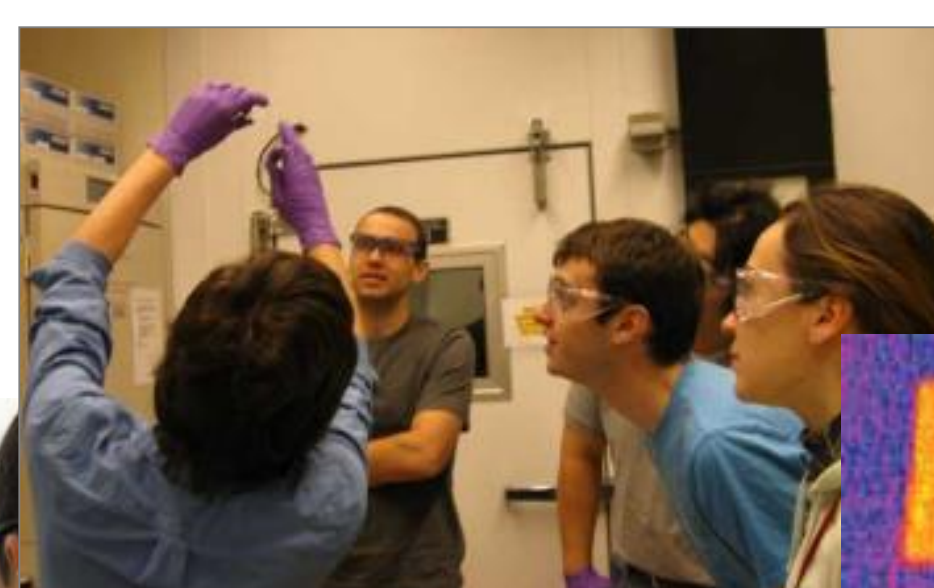
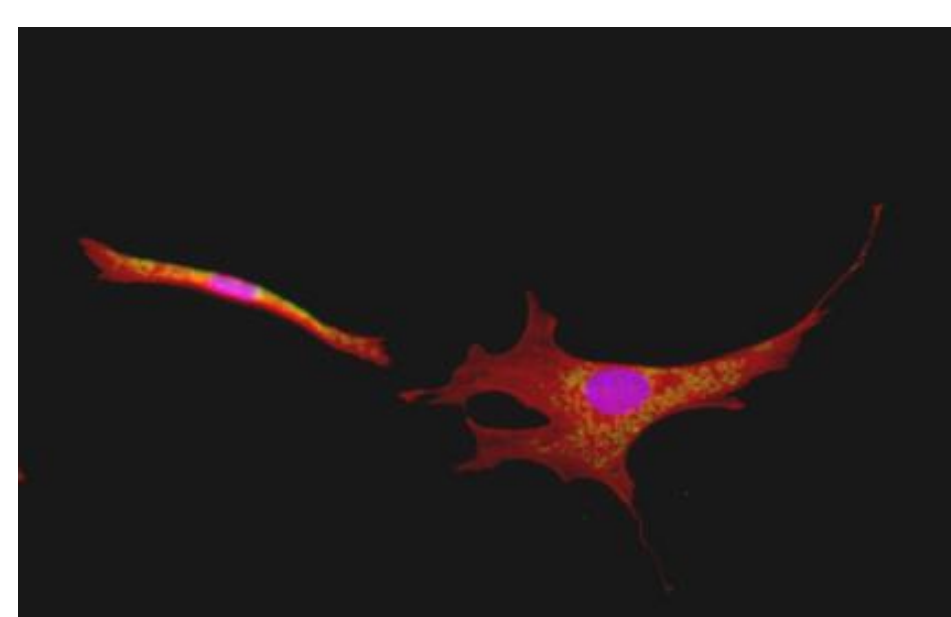
Parylene evaporation creates a pinhole-free, continuous, conformal, biologically inert polymer coating for devices



Chemical Lab

Chemistry tools available in the NBTC facility include microbalance scales, fume hoods, glassware and disposable items, many standard chemicals, and access to NBTC staff expertise

Minicourses



Interdisciplinary research often requires new skills. Minicourses are intensive, hands-on classes that allow researchers to develop practical lab skills in new fields over several days. Instruction takes place in groups of 6 or less to ensure individual attention.

Cell Culture

- Safe and sterile material handling.
- Thawing, feeding, and passaging cell lines.
- Identifying contaminants
- Antibody and non-antibody cell staining.
- Live cell stains
- Fluorescence imaging

Microfluidics

- Cleanroom lab techniques
- Microfabrication protocols
- Fabrication of microfluidic masters.
- Device setup, packaging, and imaging