Biomolecular Nanotechnology Center

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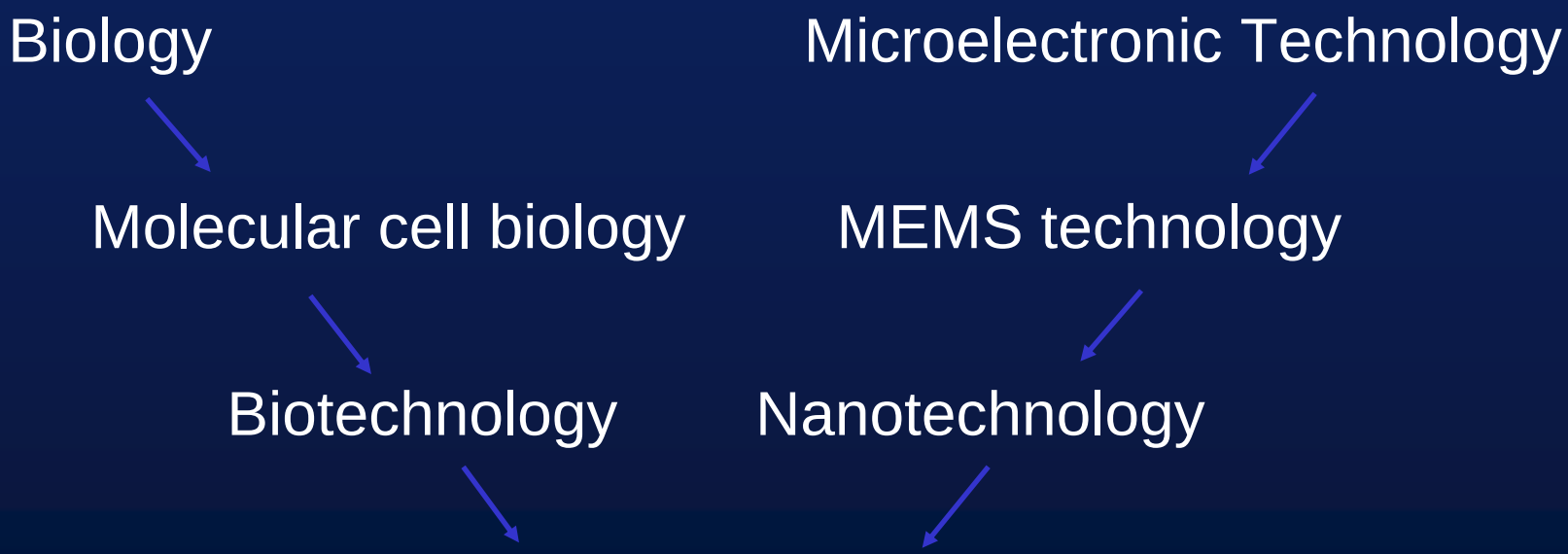
Biomolecular Nanotechnology



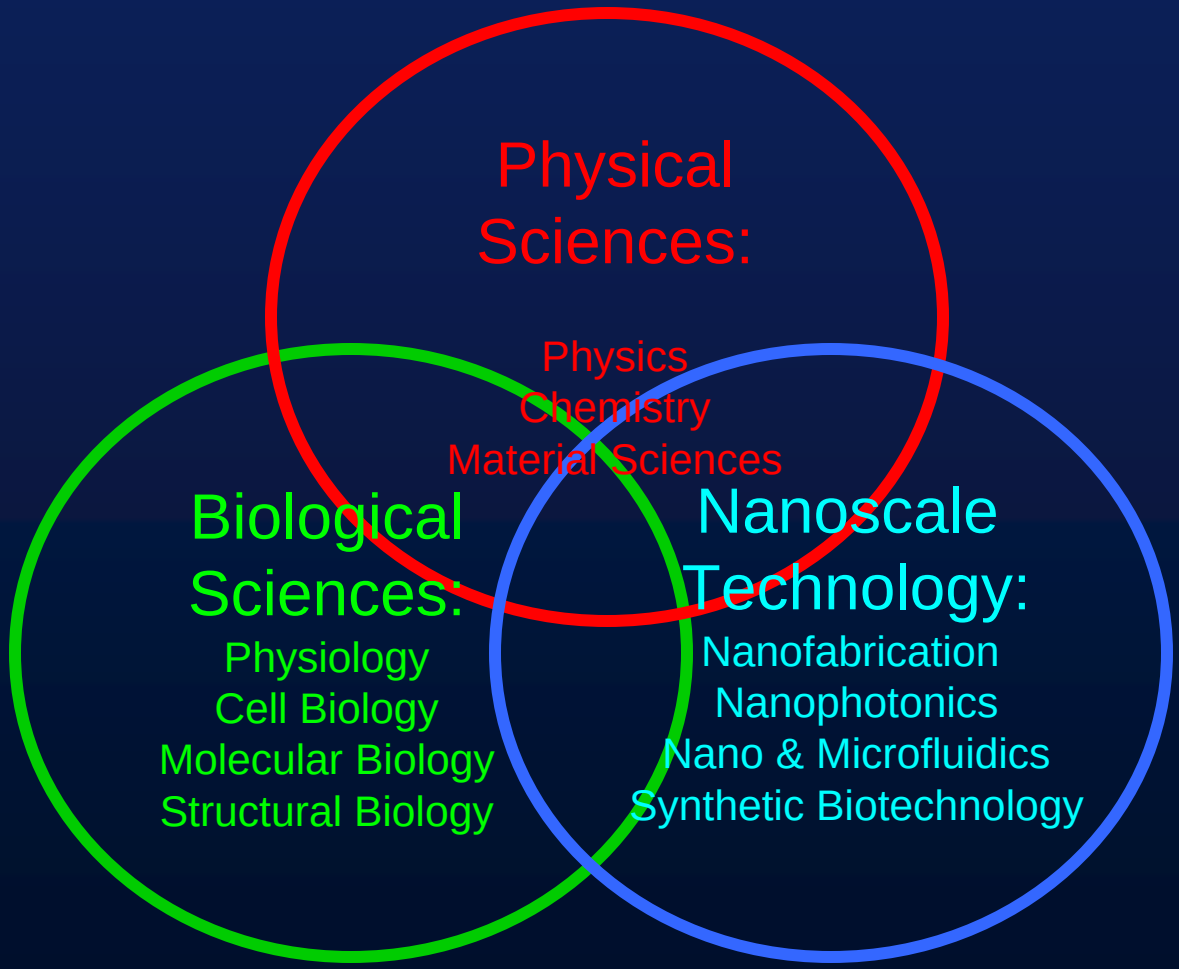
- length scale match of inorganic manipulation and biochemical processes

- molecular scale integration of organic and inorganic components

Vision of the BNC

- Developing the educational and technological infrastructure in biological nanotechnology and soft-state biologic devices for molecular medicine.
- Creating new connection of biological sciences, chemical biology, single biomolecular physics, and nanotechnology.
- Transmitting interdisciplinary knowledge in the areas of nanoscale probes, nanofluidic IC, BASICs, and systems bioengineering for future molecular diagnostics and therapeutics.

Foundation of the BNC



The BNC at New Stanley Hall

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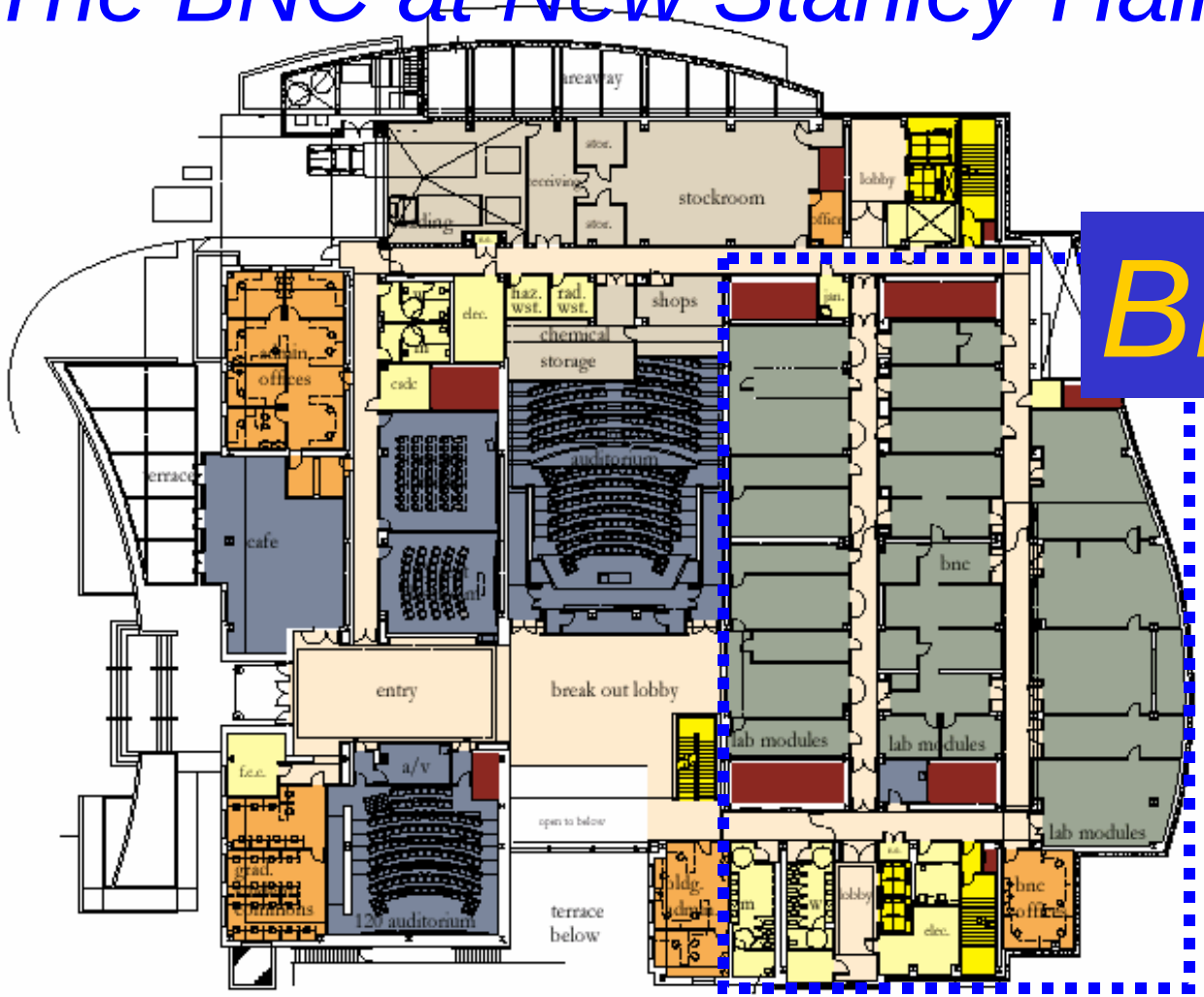
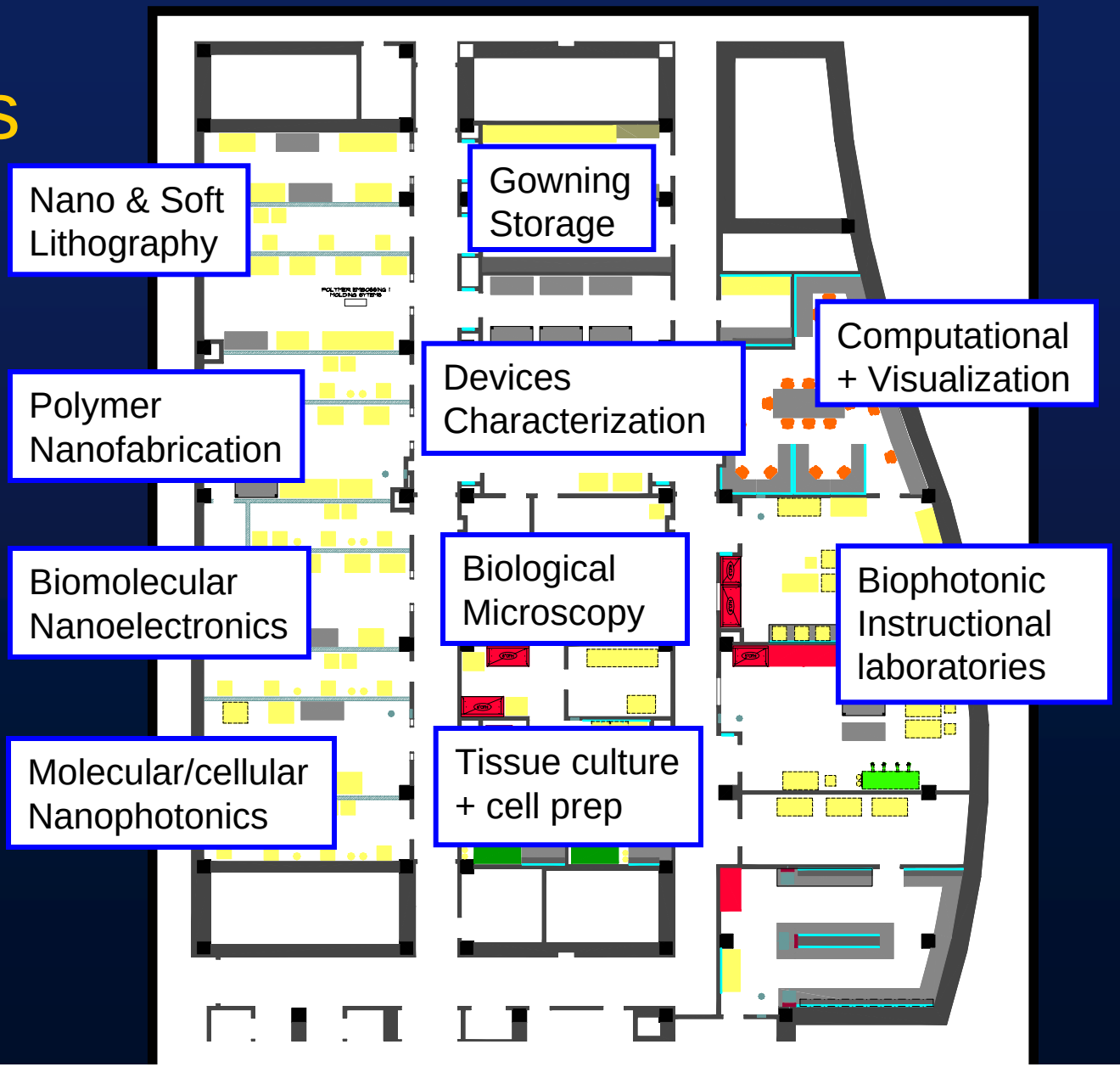


The BNC will occupy approx 12,000 ft^2 of the new Bioengineering/Biosicences Building

BNC Modules


Nano & Soft Lithography
Gowning Storage
Computational + Visualization
Devices Characterization
Polymer Nanofabrication
Biomolecular Nanoelectronics
Biological Microscopy
Biophotonic Instructional laboratories
Molecular/cellular Nanophotonics
Tissue culture + cell prep

Thrust Areas

- Nanoscale Biophotonics
  - Nanophotonic Probes for Cellular Imaging
  - Single Molecular Detection Chip
- Neuroelectronics and Neurophysiological Devices
  - Soft-state Neuroelectronic Junctions
  - Biomolecular Nanoelectronics
- Nanomedicine/Tissue Engineering
  - Smart Drug Delivery
  - Bioplolymer & Biomaterial Interfaces
- Bioanalytical Sciences & Medical Diagnostics
  - Biomolecular-Polymer-Opto-Electro-Microfluidic-Systems (BioPOEMS)
  - Biologic Application Specific Integrated Circuits (BASICs)

Nanoscale Biophotonics

- Nanophotonic Probes for Cellular Imaging
  - *Nano-crescent Moon*
  - *nSERS*
  - *Label-free Proteomic CD*
- Single Molecular Detection Chip
  - *SMD Biophysics*
  - *Ultrafast Genomic Chip*

Neuroelectronics and Neurophysiological Devices

- Soft-state Neuroelectronic Junctions
  - *Integrated Multiple Patch-clamp Array Chip Technology (IMPACT)*
  - *Cell-cell Communication Chip*
  - *Artificial Retina*

- Biomolecular Nanoelectronics
  - *Protein Folding/unfolding Detection Chip*
  - *Systems Biology via BioCMOS*

Nanomedicine/Tissue Engineering

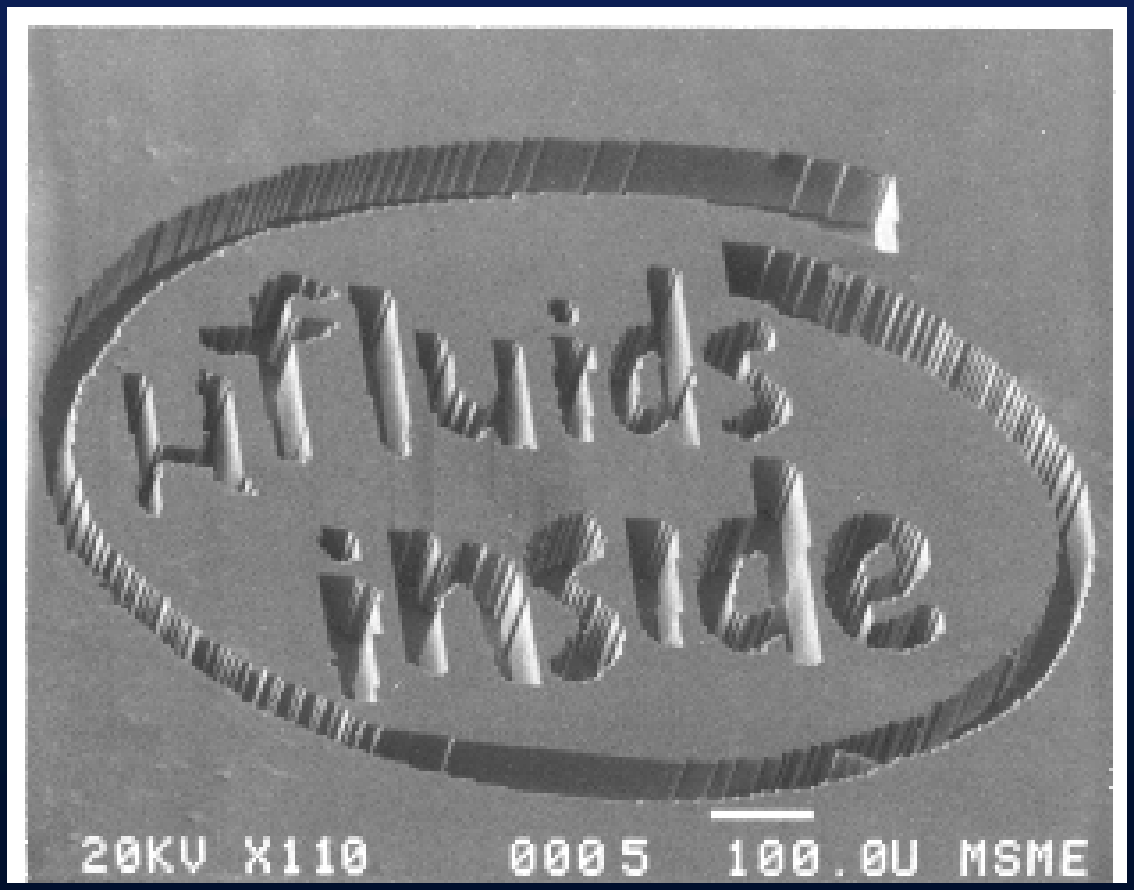
- Smart Drug Delivery
  - *Smart Nanobowls*
  - *Photothermal Modulator*
- Biopolymer & Biomaterial Interfaces
  - *Functional Biomaterials*
  - *Molecular Imprinting*
  - *3D Nano- & Microscale Structures*
  - *Nano- & microscale Teflon machining*

Bioanalytical Sciences & Medical Diagnostics

- Biomolecular-Polymer-Opto-Electro-Microfluidic-Systems (BioPOEMS)
  - *Molecular Diagnostic Chip*
  - *Preventive Medicine Chip*
  - *Biologically Inspired Optical System*
- Biologic Application Specific Integrated Circuits (BASIC)
  - *Systems Biology via BASIC*
  - *Combinatorial Biology*
  - *Quantitative Cell Biology*

Intel's Donation for Teaching Lab

Nanobiotechnology Instructional Laboratory



Summary

Integrative Bionanotechnology

- Invention of new experimental tools to provide high-quality, high-speed, high throughput screening method.
  - *Nanophotonic probes, Nano- & microfluidics, sub-femtochemistry lab-on-a-chip, BioASIC(BASIC).*
- Establishment of "systems bioengineering-oriented" core facility for effective interdisciplinary research environment.
- Education of scientists and engineers with sound interdisciplinary training
  - *Balanced experimental, modeling, and quantitative biology skills*.

Summary

"If you want to practice biology, do it on the leading edge and if you want to be on the leading edge, invent new tools for deciphering biological information."

William Dreyer
1928-2004