

## Joint School of Nanoscience and Nanoengineering Site Tool List

### ADVANCED MICROSCOPY

#### Charged Particle Microscopy

- Zeiss Auriga FE-SEM with Focused Ion Beam, STM, GIS and EDX
- Zeiss Evo Environmental SEM with EDX
- Zeiss Libra 120 TEM with EELS
- Zeiss Orion Helium Ion Microscope (HIM)
- Hitachi S4800 FE-SEM with EDX

#### Sample Preparation

- Leica ACE200 Sample Coater with planetary stage, plasma, metal and carbon deposition
- Southbay PC2000 Plasma Cleaner
- Buehler MetaServ 250 Grinder-Polisher
- Model 590 Tripod Polisher for TEM sample prep

- SC Fluids CPD110 Critical Point Dryer

#### Advanced Optical Microscopy

- Zeiss Axio Spinning Disc Confocal Fluorescence Microscope with Live Cell Imaging
- Zeiss Axio Imager Z2.m Upright Fluorescent Materials Microscope
- Zeiss Axio Observer Inverted Phase Contrast Microscope

#### Probe Microscopy

- Agilent 5600 LS Atomic Force Microscope
- Hysitron TI950 Nanoindenter with SPM
- Nanoscience TRAX STM

### ANALYTICAL CHEMISTRY

#### Spectrometry and Chromatography

- Varian 240 MS/GC Ion Trap Mass Spectrometer
- Varian 320 MS GC/LC Triple Quad Mass Spectrometer
- Varian 500 MS LC/MS Ion Trap Mass Spectrometer
- Varian 920 HPLC Liquid Chromatography System
- 400 MHz and 700 MHz NMR with Liquid, Solid, and Cryo Probe Capability
- Rigaku (Oxford) Gemini X-Ray Diffractometer with Mo, Cu sources

#### Light-based Spectroscopy and Characterization

- Horiba XploRA One Raman Confocal Microscope
- Horiba FluoroMax-4 Spectrofluorometer
- Varian Cary 6000i UV-Vis Spectrophotometer
- Varian 670 FTIR Spectrometer w/ATR
- Varian 670 FTIR/610 Microscope Spectrometer w/Single Point Detector
- Varian 710 ICP-OES Axial Spectrometer
- Varian Cary Eclipse Fluorescence Spectrophotometer
- Malvern Zetasizer Nano ZS
- Microtrac NPA152-31A Zetatrac
- Nanosight LM10-HSBF Nanoparticle Characterization
- Rame Hart 260-F4 Goniometer/Tensiometer

### MICRO AND NANOFABRICATION

#### Cleanroom

- Kurt Lesker PVD75 – Thermal and E-beam Deposition
- Kurt Lesker PVD75 – DC and RF Sputtering
- Novellus PECVD (SiO<sub>2</sub> and SiN)
- 4" Vapor Phase Dep Furnace for 2D Materials
- 8" Annealing Furnace (O<sub>2</sub>, Ar, N<sub>2</sub> and Forming Gas)
- Laurell Spin Coater/Processer
- OAI 8808 4/8" Mask Aligner w/DUV
- LAM Rainbow 4400 8" RIE
- STS Inductively Coupled Plasma (ICP) Deep Reactive Ion Etcher (DRIE)
- Fisher 282a Vacuum Oven
- Wet benches - multiple

- Tousimis 916B Critical Point Dryer
- YES 310TA HMDS Vapor Prime Oven
- Ultron UH-102 UV Curing Oven
- IPEC 472 4"-8" Chemical Mechanical Planarization (CMP) System
- Ontrak 8" Brush Cleaner
- Reynolds Tech Gold Plating Bench
- Plasma Etch Asher/Etcher/Cleaner
- Zeiss EVO LS-SEM with E-beam Litho
- Gaertner Scientific LSE-WS Ellipsometer
- KLA-Tencor P-10 Profilometer
- Jandel 4-point Resistivity Probe

### Materials Lab

- Nanocomposite Capability
- Electrospinning Setup
- Large Substrate Furnace (1600 °C)
- South Bay Tech 650 HC Diamond Saw
- Flow Int M2-1313b Water Jet Cutting Table
- Fusion 3Design F306 3D Printer
- Stratasys J750 3D Printer
- Dual Draft workbenches
- Autoclave

### Battery lab

- Furnaces, Enviro chamber, Glovebox for battery production

### Chemistry

- CEM Discover Solvent-Based Synthesis Microwave
- Glove box
- Schlenk Lines
- Freeze Dryer
- Thermo Scientific XFR High-Capacity Floor Centrifuges

### Microarray Printing or Patterning

- Horiba XACTII Arrayer System
- Microfab Jetlab4 Ink-Jet Printer

## MATERIALS TESTING

### Physical Testing

- Instron 3384 Materials Testing System w/Env. Chamber
- Instron 8802 Dynamic Testing System
- Instron 9250G Impact Test System
- Tenney C-Evo Environmental Test Chamber 10cu. ft.
- Hysitron TI 950 Nanoindenter

### Thermal Analysis

- ThermTest TPS2500S Thermal Conductivity w/anisotropy
- PerkinElmer DMA 8000 Dynamic Mechanical Analyzer
- PerkinElmer DSC 6000 Differential Scanning Calorimeter

- TA Instr. Q200 DSC w/ Cooling System
- TA Instr. TGA Q500 Thermogravimetric Analyzer

### Electrical Testing

- Agilent Technologies 4294A Impedance Analyzer
- Agilent Technologies 54624A Oscilloscope
- Cascade REL-4800 Probe Station
- Hewlett Packard 34401A Multimeter
- Kiethley Instruments 2602A Dual Channel Source Meter
- Princeton Applied Research VeraSTAT4 w/ FRA Voltammetry System Potentiostat/Galvanostat
- Agilent Network Analyzer on AFM
- Axon P10 Patch Clamp

## NANOBIOLOGY

### Fluorescence/Assay Systems

- BD Biosciences FACS Aria III Flow Cytometer System
- BioTek µQuant Spectrophotometer
- BioTek PRC384 Microplate Sample Processor
- BioTek MX/Mono-based Microplate Reader
- DNR MF ChemiBIS Image Analysis System
- DNR MiniLumi Bio Imaging System
- Nexcelom Bioscience Cellometer Visio Trio Cell Profiling System
- Thermo Scientific Nanodrop 2000c Spectrophotometer
- Agilent Technologies G1030AX 2100 Bioanalyzer
- Horiba SPRi-LAB+ Surface Plasma Resonance System
- Gel Electrophoresis System
- Transilluminator

### Sequencing/Genomics

- Illumina MiSeq DNA Sequencer
- Covaris Ultrasonicator
- Applied Biosystems 7500 Fast PCR System
- Stratagene Robocycler Gradient 96 Gradient Thermal Cycler

### Computational Modeling Core

- Cray XC30 Supercomputer with GPU and CPU
- Cave 3D Visualization Suite
- Dell Quad Core computers – Multiple
- Software packages incl. Accelrys, Material Studio, ANSYS, GROMACS, Lammmps, MATLAB

### BSL3 Lab Space

### Hydroponics Lab Space

### Siemens Magnetom Trio MRI 3T