

## Columbia Nano Initiative (CNI) Shared Labs Equipment and Capabilities List

### Thin film Deposition and thermal processing:

- Evaporator Thermal, Edwards BOC/Auto 306
- Evaporator (Thermal/E-beam) and Sputter, Angstrom EvoVac Multi Deposition System
- UHV Evaporator, Angstrom Nextdep deposition system.
- AJA , Orion-8 Dielectrics Sputtering System - coming soon
- AJA, Orion-3 Metal Sputtering System
- ALD, Cambridge Nano Tech Inc. Savannah 200
- PECVD, Oxford Instruments, PlasmaPro NPG80
- Cressington, 108 Manual Sputter Coater
- Furnace, Expertech LPCVD CTR-125 for deposition of SiO<sub>2</sub>, Si<sub>3</sub>N<sub>4</sub>, and anneal
- Solaris 100, Rapid Thermal Anneal

### Photo and e-beam Lithography:

- Mask fabrication, Heidelberg DWL 66+ Laser Writer - coming soon
- Mask fabrication, Heidelberg µPG 101 Laser Writer - 3 micron
- Electron Beam Lithography, Nanobeam nB4
- Electron Beam Lithography, Nanometer Pattern Generation System on a NovaNano SEM
- Mask Aligner, Süss MicroTec MA6
- Mask Aligner, Süss MicroTec MA6 with DUV source and BS alignment
- Reynoldstech photo benches, spinners, Laurell spinner
- HMDS YES oven
- Blue M overn
- Thermo Fisher vacuum oven.

### Dry Etch:

- ICP-RIE - Cl, Oxford Plasma Pro Cobra
- ICP - F based, Oxford PlasmaLab 80+, with added Bosch process.
- ICP/DRIE - F based, Oxford Plasma Pro Cobra
- Plasma Asher/Etch, Anatech SCE-110 RF
- Plasma Asher/Etch, Diener Plasma Etch

### 2D Materials Processing:

- Glove box N<sub>2</sub> inert environment 2D materials processing including 2 Autofinders and a Horiba XploRA micro-Raman



### **Metrology and Characterization:**

- Optical Microscope, Nikon Eclipse
- Optical profiler, Wyko NT9100
- Surface Profilometer, P17, KLA-Tencor
- Ellipsometer, J. A. Woollam, Alpha-SE
- Variable Angle Ellipsometer, J. A. Woollam
- Atomic Force Microscope, Bruker, Dimension, ICON, FastScan and Nanomanipulation
- Atomic Force Microscope, eZ
- Spectrophotometer, Agilent 8453 UV/Vis
- SCXRD, Agilent SuperNova
- Powder XRD, PANalytical XPert3
- Zetasizer, Malvern Nano-ZS
- TGA, TA Instruments Q500
- X-ray Photoelectron Spectroscopy, Phi Electronics, Phi 5500
- Micro-Raman spectroscopy, Renishaw inVia
- Agilent Gel Permeation Chromatography
- EcoSEC Gel Permeation Chromatography, for UV-RI
- Micromeritics ASAP 2020 HV BET analyzer

### **Backend and Packaging:**

- Dicing Saw, Disco, DAD3220
- Wire Bonder - TPT HB10
- Critical Point Dryer, Bal-Tec 030
- Chemical Mechanical Polishing - G&P Poli 400L
- SCS - Paryelen Coater

### **Electron Microscopy and Sample Preparation:**

- Scanning Electron Microscope, Carl Zeiss, Zigma VP
- Scanning Electron Microscope, FEI, Nova Nano450
- Transmission/Scanning Transmission Electron Microscope (S/TEM), FEI, Talos F200X
- Optical Microscope, Zeiss, Axioscope A1
- Optical Microscope, Zeiss, stemi DV4
- Diamond Saw, Buehler 11-1280-160
- Dimple Grinder, Gatan 656
- Polisher, South Bay Technology, 910
- Precise Ion Polishing System, Gatan, PIPS II 695
- Plasma Cleaner, Gatan Solarus 950





#### Software:

- Beamer
- Tracer
- Layout Editor
- ASTAR TEM phase mapping

### CNI Shared Labs Mission and Objectives

- Provide the Columbia University research community with access to cutting-edge micro and nanofabrication and characterization equipment
- Support preeminent leadership in Nanoscience and Engineering
- Provide technical support for equipment use, process development, and training for users from Columbia University, other academic institutions, and Industry

For more information on CNI labs equipment please contact: Dr. Nava Ariel-Sternberg: [na2661@Columbia.edu](mailto:na2661@Columbia.edu) or [cnilabs@Columbia.edu](mailto:cnilabs@Columbia.edu) or visit our website at: <https://cni.columbia.edu/shared-labs>

