Summary of Skill Sets Taught in the 6 Nanotechnology Courses

Basic Nanotechnology EHS Awareness

- Basics of Chemical and Material Properties—Role of Scale
- Chemical and Materials Handling, Storage, and Disposal
- Nanotechnology Health, Safety, and Environmental issues

Nanotechnology Equipment and Processing Foundation Skills

- Chemical Hoods and Glove Boxes: Use and Maintenance
- Cleanrooms: Use and Maintenance
- Pumps, Flow Control Systems, Scrubbers, Sensors: Use and Maintenance
- Vacuum Systems: Use and Maintenance
- Plasma Generating Systems: Use and Maintenance
- Furnaces, Ovens, and Rapid Thermal Annealing Equipment: Use and Maintenance
- Chemical Facilities and Maintenance
- Contamination Control
- Process Integration
- Introduction to Statistical Process Control

Nanotechnology Patterning

- Optical, e-beam, and Ion Beam Lithography
- Stamping and Imprinting Lithography
- Chemical techniques; e.g., Block co-polymer and SAMs

Nanotechnology Fabrication

- Top-down Fabrication
  - Reactive Ion, Sputter, and Wet Etching
  - Chemical Vapor and Physical Vapor Deposition Systems
  - Ion Beam, Plasma, and Chemical Materials Modification
  - Nanoparticles: Etching and Grinding Approaches
- Bottom-up Fabrication
  - Chemical, Physical, and Biological Self-Assembly
  - Nanoparticles: Colloidal Chemistry
  - Nanoparticles: Plasma Approaches
  - Nanoparticles: Chemical Vapor Deposition Approaches

Nanotechnology Characterization

- Optical Microscopy
- Scanning Probe Microscopy
  - Atomic Force Microscopy
- Electron Microscopy
  - Scanning Electron Microscopy (SEM and FE-SEM)
  - Transmission Electron Microscopy (TEM and FE-TEM)
- Chemical Characterization
  - X-ray (EDS)
  - Secondary Ion Mass Spectroscopy
  - Auger Electron Spectroscopy
  - Fourier Transform Infrared Spectroscopy
- Electrical Characterization
  - Current-Voltage Measurements
  - Capacitance Measurements
  - Opto-electronic Device Measurements
- Physical Characterization
  - Spectrophotometer
  - Profilometer
  - X-ray Diffraction

Nanotechnology Professional Skills

- Team Building
- Problem Solving
- Project Organization and Planning
- Research Skills
- Assessing Cost of Ownership
- Presentation Skills
- Technical Reporting and Documentation
- Handling and Generating Intellectual Property

NACK NETWORK
Building College-University Partnerships for Nanotechnology Workforce Development