

ADVANCED ELECTRONICS R&D AND MANUFACTURING

IN NEW YORK'S CAPITAL REGION

(Updated: January 2023)



ASSETS

- ▶ Albany NanoTech Complex
 - **\$15B** in public and private investment
 - **1.65M sf** facility with **300** toolsets
 - **140,000 sf** of class 1 capable cleanrooms
 - Wet labs, metrology labs and 3D packaging
- ▶ R&D capabilities include:
 - Power Electronics/Mixed Signals**
 - Wafer Processing & Manufacturing**
 - Lithography Tooling**
 - Materials Research**
 - Compound Semiconductor Research & Applications**
 - Data Analytics**
 - Potential for Commercial Wafer Production**
 - Artificial Intelligence**
 - Nanomedicine**



Center for Semiconductor Research:

- **\$500M** partnership with leading semiconductor companies, including:



Semiconductor Start-Ups:



Bleximo

Quantum processor microarchitectures



NYDesign

Integrated chip design



FastWatt

Compact power conditioner using wide-band gap semiconductors



LUX Semiconductors

Semiconductor recrystallization technology for flexible electronics



SelfArray

Direct-view LED



Pallidus

Prouce silicon carbide crystals



ThermAura

Thermoelectrics



SMART Pad

Wafer polishing pads with micro features



Menlo Microsystems

Electronic switches



NoMIS Power Group

Silicon carbide semiconductor and module development

GlobalFoundries:

- Fab 8 in Malta, near Saratoga Springs, is one of the nation's leading semiconductor manufacturing operations
- **\$15B, 2.9M sf** facility with **3,000+** workers
- **450,000 sf** of clean room and clean space
- Recently announced new Fab 8.2 will double output

IBM Research AI Hardware Center:

- **\$300M** center for R&D, emulation, prototyping, testing and simulation activities for the new AI cores, with specialization in wafer processing

Materials Engineering Technology Accelerator (META Center):

- Applied Materials' R&D hub for prototyping of new materials, process technologies and devices
- **\$880M** public-private investment

Wolfspeed & Danfoss Silicon Power:

- Danfoss uses silicon carbide chips to manufacture power modules at Quad-C in Utica
- Tools & equipment from the Albany NanoTech Complex were transferred to the Marcy Nanocenter near Utica to expedite production at Wolfspeed's **\$1 billion 200mm** silicon carbide wafer fabrication facility
- **900** jobs at Marcy Nanocenter and Quad-C facility

CAPITAL REGION INNOVATION PROWESS

- **1,404** semiconductor device patents awarded in U.S. listing at least one Capital Region inventor in 2019 – *more than any state except CA*
- **15th** most workers in the Scientific R&D Services jobs (8,236 in 2021*)
- **\$1.17B** in private business R&D spending in 2018*
- **\$1.53B** in Computer & Electronic Product exports in 2021 – *top 28 exporting metro*
- **\$10.3M** in NSF SBIR/STTR seed funding for small business semi-conductor-related R&D since 2015
- **\$387.3M** spent on engineering R&D by Capital Region colleges and universities in FY2020

*Albany-Schenectady-Troy MSA



Albany NanoTech Complex



GlobalFoundries Fab8, Malta

Supply Chain:

Advanced Materials & Chemicals

Pallidus
Momentive Performance Materials
PeroxyChem
Surpass Chemical

Construction

Beard Integrated Systems, Inc.
Total Facility Solutions Inc.

Engineering

Exyte
DPS
EYP

Equipment

Edwards Vacuum
Precision Valve and Automation
Banner Industries
Axcelis Technologies, Inc.
EBARA Technologies Inc.
Applied Materials
Tokyo Electron
ASML
LAM Research
General Control Systems

Gas

Noble Gas Solutions
Air Liquide

Fittings

Swagelok
Harrington Industrial Plastics

ADVANCED ELECTRONICS WORKFORCE (2021)

9,791 jobs, Including:

3,101 Semiconductor and Related Device Manufacturing

6,510 R&D in the Physical, Engineering, and Life Sciences

DEGREES AWARDED (2021)

14,370 Total Degrees

3,841 STEM Degrees

1,440 Engineering & Engineering Technologies

Talent Pipeline



Technical Programs

- Training and Education Center for Semiconductor Manufacturing and Alternative and Renewable Technologies (TEC-SMART)/HVCC
- SEMI Industry Approved Apprenticeship Program/HVCC
- Capital Region BOCES: Engineering Technician Program/Mechatronics
- Fulton-Montgomery Community College: Electrical Engineering Technology
- Hudson Valley Community College: Advanced Manufacturing (w/Capital Region BOCES)
- SUNY Adirondack: Advanced Manufacturing and Mechatronics (w/WSWHE BOCES)
- SUNY Schenectady: Nanoscale Materials Technology
- SUNY Polytechnic Institute Northeast Advanced Technology Education Center & Advanced Manufacturing Performance Center (Advanced Manufacturing Technician Program, Mechatronics, Facility Operations)

Engineering Degree Programs

- SUNY Polytechnic Institute: Nanoscale Engineering, Nanoscale Science, Advanced Technology, Semiconductor Processing
- Rensselaer Polytechnic Institute: Materials Engineering, Mechanical Engineering, Industrial Engineering, Electrical Engineering, Chemical Engineering
- Union College: Electrical Engineering, Mechanical Engineering, Nanotechnology (minor)
- University at Albany: Electrical and Computer Engineering
- Excelsior College: BS Electrical Engineering Technology (BSEET)