

NNCI: Southeastern Nanotechnology Infrastructure Corridor (SENIC)



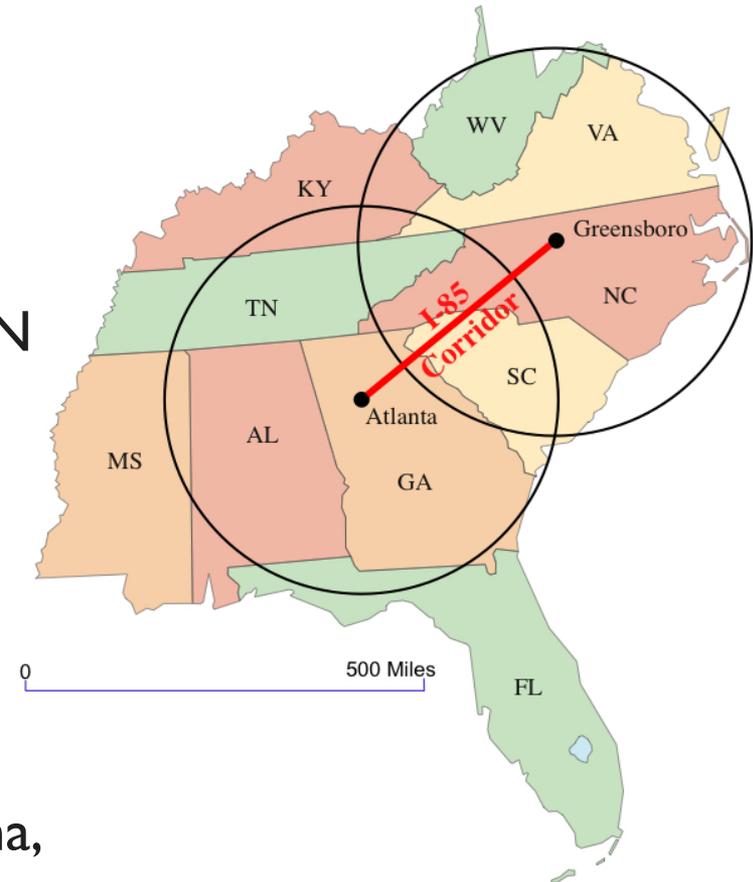
SENIC

Southeastern
Nanotechnology
Infrastructure
Corridor

What is SENIC? <http://senic.gatech.edu>

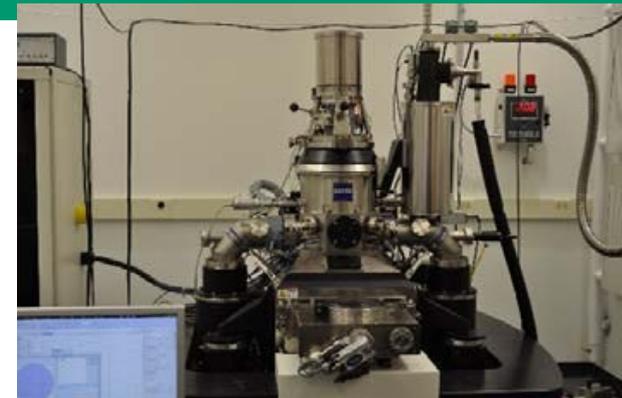
Partnership of two major & modern nanotechnology centers in the southeastern US:

- **Institute for Electronics and Nanotechnology (IEN)**, an Interdisciplinary Research Institute & NNIN site at the Georgia Institute of Technology (GT)
- **Joint School of Nanoscience and Nanoengineering (JSNN)**, an academic collaboration between North Carolina A&T State University (NCA&T) and University of North Carolina, Greensboro (UNCG)



SENIC Resources – 300+ Tools

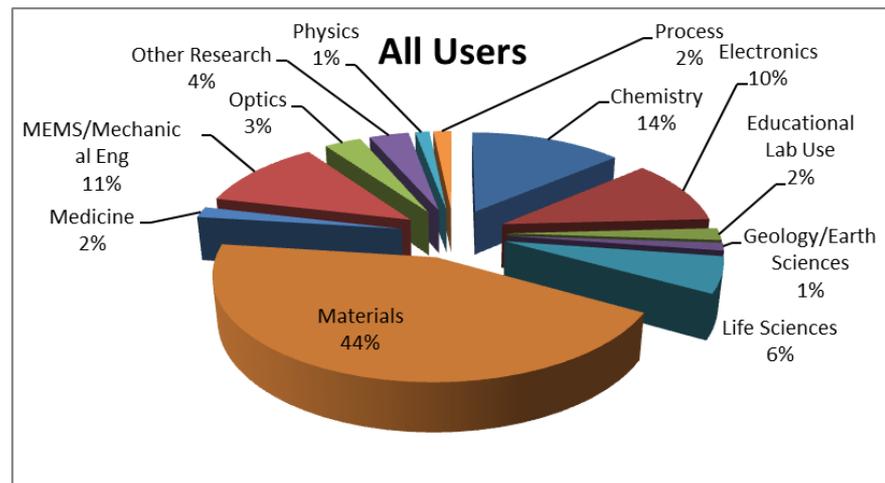
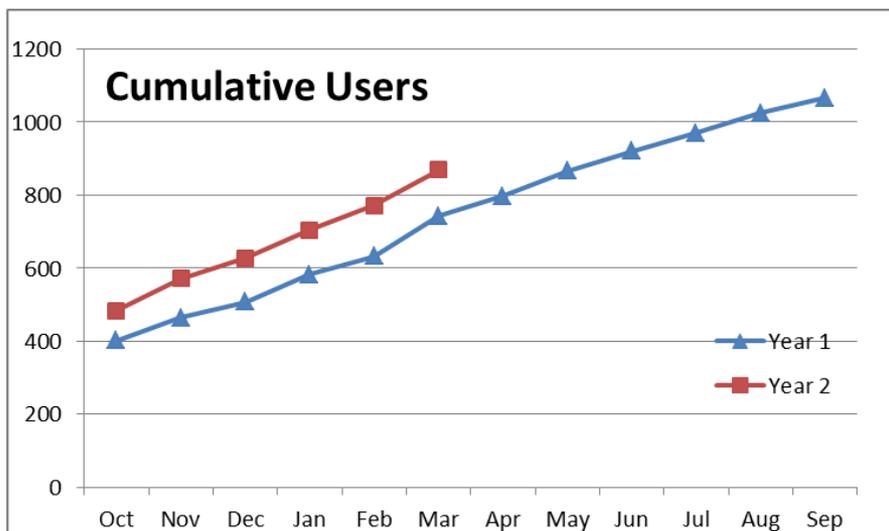
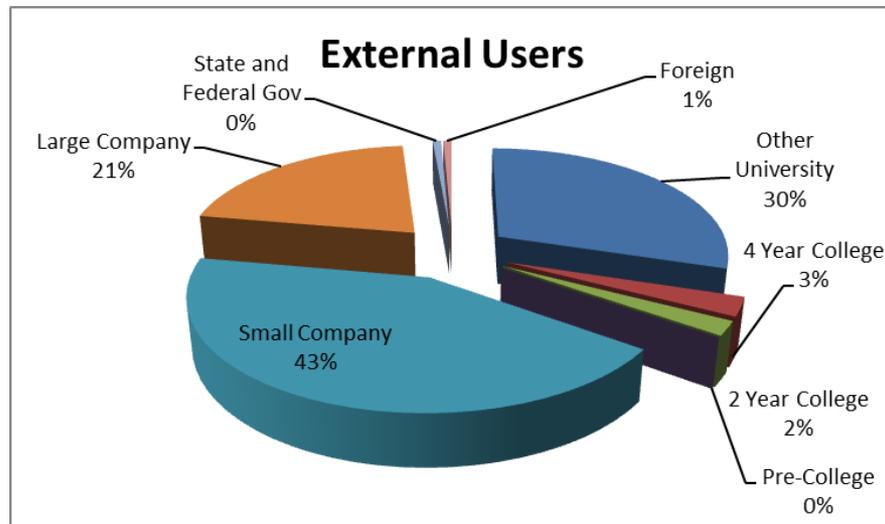
- Top-down and bottom-up micro/nano-fabrication
- Advanced microscopy and surface analysis
- Analytical chemistry
- Materials testing
- Nanobiology
- Computational/modeling resources



+ Staff Expertise

SENIC User Data (10/2016 – 3/2017)

	Year 1(12 months)	Year 2 (6 months)
Total Users	1067	870
Internal Users	903	726
External Users	164 (15%)	144 (17%)
Total Hours	79,581	41,197
Internal Hours	71,659	35,516
External Hours	7,922 (10%)	5,681 (14%)
Avg Monthly Users	450	487
Avg Ext. Monthly Users	67 (15%)	59 (12%)
New Users	313	146
New External Users	67 (21%)	53 (36%)



User Recruitment Activities

- Webpage, Social Media, Brochures
- Seminars Series (available online)
- Economic Development Outreach
- **Hosted Conferences and Workshops; Vendor Workshops**
- **Short Courses**
- Conference Exhibits in SE
- Industry and University Visits
- **Seed Grant Program**



New Tools and Capabilities

At GT-IEN

- Upgraded CVD First Nano SiGe furnace with HBr gas; Control Layer sputterer for AlN deposition; legacy etching tool for GeSe deposition; FEI Nova FIB with Omniprobe
- NanoScribe Micro 3D Printer (NSF MRI)
- Elionix EBL and Heidelberg MLA150 on order
- *System upgrades (hardware and software) to old equipment as workforce development*

At JSNN

- Installed Kurt Lesker RF/DC sputter system, wet/dry oxidation and annealing furnace, PVD system for transition metals, large substrate vacuum furnace
- Stratasys J750 3D printer (DURIP award)
- Additional upgrades to soft matter & nanobiology and analytical chemistry cores



Engineered Nanoparticles for Cooling Electronic Devices

- Baratunde Cola and his group at Georgia Tech, with collaborators at Howard University, have developed **silicon dioxide nanoparticles coated with a high dielectric constant polymer** to inexpensively provide improved cooling for electronic devices



- Published in the journal *Materials Horizons*
- **Prof. Cola received 2017 Alan T. Waterman award from NSF**
- Associated start-up company: **Carbice**

Non-Traditional Users



Tecturized Inc. (now Myavana)

- Founded in 2012 by 4 African-American female Georgia Tech engineers
- Product: Microscopic hair analysis



Kepley Biosystems

- Founded in 2013 by engineers/scientists from JSNN
- Product: OrganoBait for crustacean (carb, shrimp, lobster, etc.) fishing



Education & Outreach Activities

Workforce Development

- 4 summer REU students
- 4 interns/year from community college (Forsyth Tech)
- **30+ undergraduate and graduate assistants**
- 250+ new graduate student and postdoc trained

Outreach (to Users) & STEM Pipeline

- School visits (**NanoBus**) & science festivals
- Seminars & short courses
- 4-H curriculum
- High-school interns



Overview of the SENIC SEI Program

- I-Corps Plus
 - Georgia Tech is one of the largest training nodes for the I-Corps program
 - SENIC's SEI program seeks to build societal considerations into the I-Corps program
 - This effort would be scalable to other sites
- Nanoinformatics – can contribute to other SEI programs of work
- Advisory relationships with students, other stakeholders

Network Activity

- Home of NNCI Coordinating Office
- Hosted 1st NNCI Conference in January 2017
- Participated in ASU Winter School (January 2017)
- Participate in multiple sub-committee and working groups
- Hosted 2017 REU Convocation in September 2017
- Supported NNCI booths at Hilton Head Sensors, Actuators and Microsystems Conference (June 2017) and TechConnect World Innovation Conference and Expo (May 2017)
- Participated in National Nanotechnology Day Activities (10/9)

Thank You!

<http://www.nnci.net>

<http://senic.gatech.edu>

<http://www.ien.gatech.edu>

<http://jsnn.ncat.uncg.edu>



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[@senicnanotech](https://twitter.com/senicnanotech)



[/senic-nanotech-42b099117/](https://in.linkedin.com/company/senic-nanotech-42b099117/)

Panel: New Education & Outreach Concepts

- Employ undergraduate & graduate students in shared-user facilities
- Offer senior design projects associated with shared-user facilities
- Offer internships for community college students; engage in curriculum activities with community colleges



SENIC Impact

- Facilities
 - **Installed or upgraded nearly 20 tools**
 - Served 1000+ incl. 160+ external users, representing 70 companies and 20 colleges/universities
 - Established reciprocal billing capabilities
 - **Contracted with 45 new external entities in Year 2**
 - Established joint staff meetings (executive committee & technical)
 - **>600 journal publications and conference presentations (2016)**
- Education, Outreach & SEI
 - **Connected with 10,000+ individuals at 100+ events**
 - Established SENIC REU programs
 - Broadcast seminar series: Nano@Tech, JSNN Seminar
 - Developed modules on commercialization & societal implications to parallel iCorps