NNCI: Southeastern Nanotechnology Infrastructure Corridor (SENIC) ECCS 2025462

National Nanotechnology Coordinated Infrastructure

SENIC Partnership, Vision, and Goals

- **Partnership -** Two major & modern nanotechnology centers in the southeastern US:
- Institute for Electronics and Nanotechnology (IEN), an Interdisciplinary Research Institute at Georgia Tech
- 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)



IEN Marcus Nanotechnology Building



JSNN Building at Gateway Research Park

Vision Statement - To be a premier nano-fabrication and nano-characterization resource to southeastern US user communities from academia, small and large companies, and government organizations, providing tools, staff expertise, E&O activities, as well as SEI of nanotechnology programs

Strategic Goals – a) Develop and Serve Diverse User Base, b) Develop Strong Synergies between Partners, c) Expanding Capabilities based on Future Research Trends, d) Develop E&O and SEI Programs Targeting the SE and e) Assist NNCI Network in Becoming More Than the Sum of its Parts

Open Access Shared-User Facilities

	GT-IEN	JSNN			
Cleanroom Area	28,500 sq.ft.	8,000 sq.ft.			
# Fab./Charac. Tools	200+	100+			
Wafer Sizes	100 mm (some 150 mm) 300 mm panels (packaging)	200 mm			
Technical Staff Support	30	12			
Facility Strengths	 Broad top-down micro/nanofabrication Patterning down to <10nm Packaging facility Teaching cleanroom 	 Bottom-up material synth 200 mm wafer processing He-ion imaging and nanofabrication High-performance comp 			
Capabilities for Users from Non-traditional Disciplines	 Nanomaterial dep./growth Organic/bio cleanroom Laser machining Imaging & metrology 	 Nanomaterial synthesis Analytical chemistry lab BSL-3 lab Material testing lab 			
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200 mm Habrication Tools					





Nanoscribe 3D Lithography

Nanobiocleanroom

Oliver Brand¹, David Gottfried¹, Mikkel Thomas¹, and Diana Hicks² ¹Institute for Electronics and Nanotechnology (IEN), ²School of Public Policy, ^{1,2}Georgia Institute of Technology Shyam Aravamudhan^{3,4}, Sherine Obare^{3, 4, 5}, and Daniel Herr^{3,5} ³Joint School of Nanoscience and Nanoengineering (JSNN), ⁴North Carolina A&T State University and ⁵UNC Greensboro



SENFN – Southeastern Nano Facility Network, regional network of 21 core facilities from 7 southeastern US states



546 users/month (2021-22; 6 months)

Geology/Earth Sciences 2%

One-stop-shop for fabrication and characterization needs Key areas of expertise include: DVANCED Nanomaterials & Nanostructures MATERIALS **Flexible & Wearable Electronics** Quantum Sciences **Next-Generation Electronics** Optoelectronics & Photonics MEMS, NEMS, Sensors and IoT Antiferroelectrics, GT Design using Machine Nanomembrane Life Sciences, Medicine & Health Learning, GT electronics, GT Packaging and Systems Integration Materials • Processes • Devices • Systems & Applications Support for NSF 10 Big Ideas and societal grand challenges in security, energy, environment, health Environmental Sustainability - Abatement System Improvement **Current Abatement Systems (20+ years old) Replace with Dry Abatement Systems** Chemical Equipment Technology CET-J2 Scrubber Jupiter Scientific Callisto Delatech SD 202 R Scrubber Delatech 875 CDO Burn Box Total investment - ~\$220K Low OEM support; High utility demand (costly to operate) Savings Total utility cost - ~\$15K/month; 54% of which is water cost Payback period - 17 months **10-year savings - ~\$1.29M Education, Outreach, and Dissemination** • Rise to Nano; Intro to REU, Community College Internships Nano Remote SEM Access Facility Training – Teacher Training, Graduate, Postdoc **Tools &** Modules, Demos Professional Workforce **Resources to** Interactive Tours, Development **Developmen** Encourage STEM Science Fairs **Open house - NC Science Festival SENIC Resources Focus on Southeast** SENIC Awareness - Short Non-traditional user Courses, Workshops, User and HBCU/MSI Broadening Institute for M Seminars; Targeted Outreach Particip. outreach marketing, media, visits • User Facility Mtg Accessibility - Nano-Ambassadors Remote work Affordability -• On-campus Catalyst, Seed Grants Programs Summer Teacher Workshop **Societal and Ethical Implications** Nano-Informatics **Economic Impact Analysis** ECONOMIC IMPACT OF NNCI -FUNDED NANOFABRICATION AND CHARACTERIZATION FACILITIES Publications, NSF CAREER. SBIR awards **Assessing SENIC Impacts** A CASE STUDY AND TOOLKIT Research Impact - Bibliometric Georgia | Center for Tech | Economic Development Tech | Research analysis Presented at the NNCI Site Human Resource Impact -Interviews and analysis of 13 Georgia-Directors monthly meeting based companies who used GT-IEN Alumni tracking, Case studies modeled using IMPLAN for State of Economic Impact Georgia (Jan Youtie and Alfie Meek) For more information about using SENIC facilities, contact: Paul Joseph, Ph.D. Shyam Aravamudhan, Ph.D. Georgia Tech External User Contact **JSNN External User Contact**



SENIC-Supported Principal Research Areas





- Chamber replaces CDO Burn Box







	EMPLOYMENT	INCOME	VALUE ADDED (GDP)	OUTPUT
DIRECT	111	\$9.5M	\$12.6M	\$24.3M
INDIRECT	80	\$4.8M	\$7.5M	\$13.9M
INDUCED	84	\$4.0M	\$7.6M	\$13.1M
TOTAL IMPACT	275	\$18.3M	\$27.7M	\$51.2M



paul.joseph@ien.gatech.edu

saravamu@ncat.edu