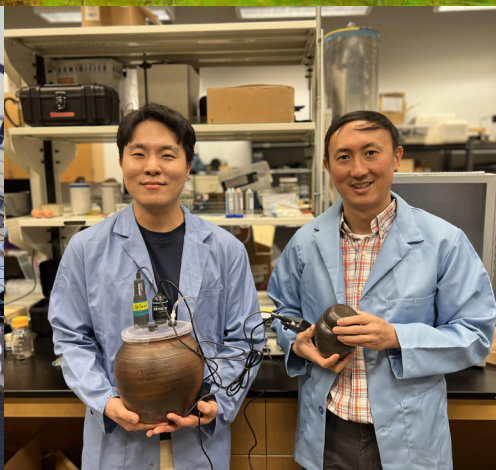




Georgia Tech

Parker H. Petit Institute for  
Bioengineering and Bioscience



# PARKER H. PETIT INSTITUTE FOR BIOENGINEERING AND BIOSCIENCE (IBB)

## 2023 IMPACT REPORT





## A MESSAGE FROM THE EXECUTIVE DIRECTOR

**Our mission:** IBB's mission is to build a community within Georgia Tech and our partner institutions that catalyzes, cultivates, and deploys interdisciplinary research and education in bioengineering and bioscience for economic and societal benefit.

**Our strategic plan:** Aligned with key elements of the Georgia Tech strategic plan, IBB's strategic objectives are to:

- Catalyze and streamline interdisciplinary research collaborations in bioengineering and bioscience
- Support non-traditional educational opportunities and outreach
- Develop domestic and international partnerships related to health, biology, and biotechnology
- Promote translation of Georgia Tech biotechnologies and economic development

I am honored to serve as the Executive Director of IBB at such an exhilarating time for our bio-community. We have more than 287 interdisciplinary faculty researchers (engineers, scientists, and clinicians) and 1,300 trainees making unprecedented discoveries and generating innovative technologies that will transform healthcare, drive economic impact, and improve the global human condition.

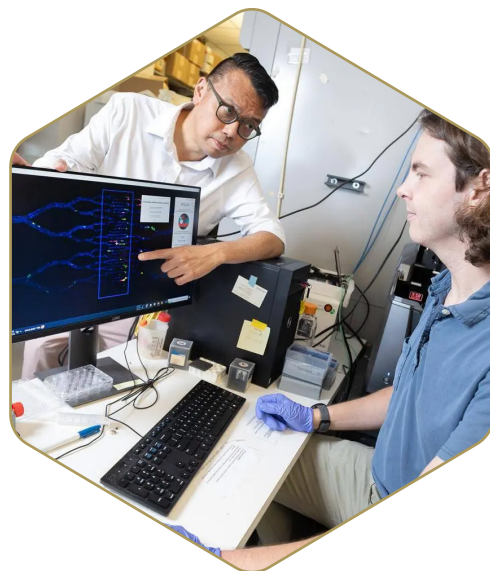
Also, with 18,000 people attending more than 400 events annually hosted by IBB, I am reminded of three words that perfectly describe our geographic strength: location, location, location. This is obviously the place to be. With our state-of-the-art core facilities, outstanding collaborative culture, generous seed funding to support projects in the critical early stages, our 16 multidisciplinary research centers, and a thriving entrepreneurial spirit, we are well equipped to “Transform Tomorrow” whether it is the next collaborative discovery, the next educational opportunity, or the next startup company.

IBB's vision is to be a global leader and exemplar in research, training, and developing tomorrow's leaders in bioengineering and bioscience. To attain this goal, we must:

- Catalyze research at the intersection of bioengineering and bioscience – solving the world's human health challenges. Specific diseases that are being impacted by the research conducted at IBB include heart disease, diabetes, cancer, infectious diseases, and neural injury. In addition, our unique state-of-the-art core facilities facilitate these transformative research activities.
- Invest in our student programs – Project ENGAGES and Petit Scholars and Mentors. We aim to remove financial barriers for students and create more opportunities for research experience at the high school and undergraduate levels to support a diverse cohort of trainees.
- Develop the next generation of research leaders – following completion of their Ph.D.s, researchers receive further training and mentoring to succeed as independent investigators. Postdoctoral fellowships provide important support during this pivotal career stage to enhance the development of these young leaders.

Thank you for reviewing our exciting and ambitious goals and considering what role you would like to play in leading IBB into an innovative, limitless future.

**Andrés J. García, Ph.D., F.B.S.E.**



# IBB BY THE NUMBERS



## IBB's Research Areas

- Biomaterials
- Cancer biology and therapies
- Chemical biology
- Drug design, development, and delivery
- Immunoengineering
- Molecular evolution
- Molecular, cellular, and tissue biomechanics
- Neuroscience and neuroengineering
- Regenerative medicine



IBB acts as an incubator for a variety of research activities and was built to tackle complex bio research problems using an interdisciplinary approach. We support grants and funding opportunities, such as the NIH Tissue Engineering grant and IBB's interdisciplinary research seed grant program.

# IBB's Research Centers

- Atlantic Pediatric Device Consortium
- Cancer Technology Innovation Center (CTIC)
- Center for Bio-Imaging Mass Spectrometry
- Center for Cell Manufacturing Technologies
- Center for Drug Design Development and Delivery
- Center for Immunoengineering
- Center for Innovative Cardiovascular Technologies
- Center for Integrative Genomics
- Center for Nanobiology of the Macromolecular Assembly Disorders
- Center for the Origins of Life
- Center for Pediatric Innovation
- Center for Pharmaceutical Development
- Georgia Center for Medical Robotics
- Marcus Center for Therapeutic Cell Characterization and Manufacturing
- Neural Engineering Center
- Regenerative Engineering and Medicine Center

## NSF ERC for Cell Manufacturing Technologies (CMA<sub>T</sub>)

- CMA<sub>T</sub> will enable robust, scalable, low-cost biomanufacturing of high-quality therapeutic cells to bring affordable, curative therapies against incurable chronic diseases
- 40 industrial partners and academic affiliates (includes UW-Madison, UPRM, and UGA)
- Partnership with the National Cell Manufacturing Consortium



## Marcus Center for Therapeutic Cell Characterization & Manufacturing (MC<sub>3</sub>M)

- Brings together clinicians, industry researchers, product developers, scientists, engineers to tackle the challenge of highly controlled, well-characterized, efficient, reproducible, and high-quality therapeutic cell manufacturing
- GMP-grade piloting facility
- In-depth Cell Characterization Platform Hub for the NIH Regenerative Medicine Innovation Project (RMIP)
- Characterize embryonic, iPSC, and adult stem cells used in RMIP clinical trials



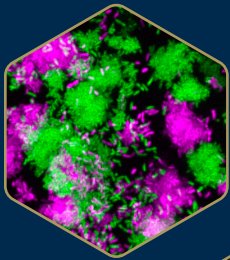


## NIH Georgia Clinical & Translational Science Alliance (GaCTSA)

- Georgia CTSA accelerates clinical and translational education, research, and community engagement to impact health in Georgia & beyond
- Georgia CTSA provides research education and career development, expert consultations and services in biostatistics, epidemiology, informatics, ethics, and regulatory knowledge, clinical research support, assistance with multi-site clinical research, community engagement, and translation of ideas



## CORE FACILITIES AT IBB



IBB's state-of-the-art research facilities, known as "Core Facilities," serve as a shared resource for the bioengineering and bioscience community. Consultation, training, and technical support are available for a variety of research projects. Users have access to over 150 pieces of lab equipment totaling over \$37 million. IBB serves as the hub of several core facilities which are available to affiliated labs at a highly subsidized rate. In 2023, our core facilities supported 650+ individual users and 170+ user groups and was leveraged into \$192 million of research funding.

IBB's core facilities include:

- 3D Printing and Medical Device Fabrication
- Applied Bioinformatics
- Biomechanics
- Biomolecular Analysis
- Biopolymer Characterization
- Cellular Analysis and Cytometry
- Genome Analysis
- High Throughput DNA Sequencing
- Histology
- Magnetic Resonance Imaging
- Microcomputed Tomography
- Molecular Evolution
- Neuro Design Suite
- Optical Microscopy
- Systems Mass Spectrometry (Proteomics and Metabolomics)



Scan here to visit our website.

## GRADUATE PROGRAMS

IBB is proud to support three interdisciplinary graduate programs at Georgia Tech: **Bioengineering**, **Bioinformatics**, and **Quantitative Biosciences**. Each of these interdisciplinary programs offers Masters and Ph.D. degrees from more than eight Georgia Tech home schools and departments.

### BIOENGINEERING

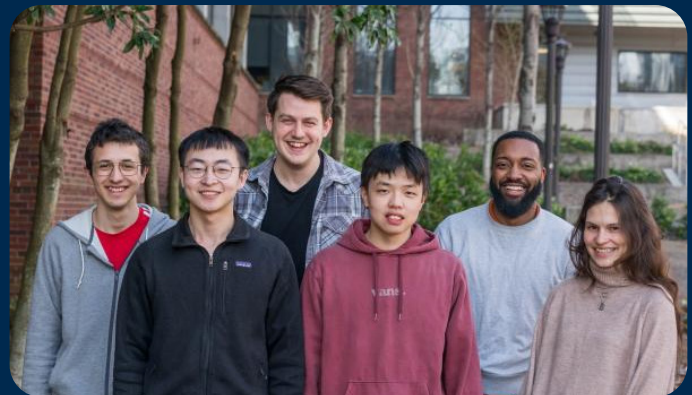
The Georgia Tech Interdisciplinary Bioengineering Graduate Program (BioE) was established in 1992 with over 190 graduates to date. Our mission is to educate students and advance research that integrates engineering principles with the life sciences to improve health, the environment, and engineering applications. The Bioengineering Graduate Program is currently ranked #3 by U.S. News & World Report, with 138 faculty from the Colleges of Engineering, Sciences, and Computing.

### BIOINFORMATICS

The mission of the Georgia Tech Bioinformatics Graduate Program is to educate and prepare students to reach the forefront of leadership in the fields of bioinformatics and computational biology, and to integrate research and education on the use of information technologies in biology and medicine.

### QUANTITATIVE BIOSCIENCES

The Interdisciplinary Graduate Program in Quantitative Biosciences (QBioS) at Georgia Tech was established in 2015. In fall 2023, we welcomed our eighth cohort, with 38 active Ph.D. students and 16 alumni. QBioS has more than 50 participating program faculty representing six participating Schools within the College of Sciences. The QBioS program will prepare a new generation of researchers for quantitative challenges, new discoveries, and fulfilling careers at the interface of the physical, mathematical, computational, and biological sciences.



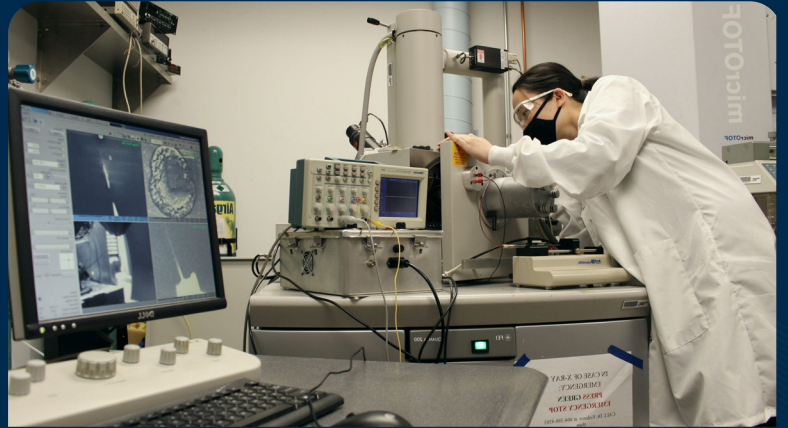


# ENABLING TECHNOLOGY TRANSFER FOR SOCIETAL IMPACT

- Six new companies formed in 2023
- 120 inventions and 15 patents licensed

## Entrepreneurship programs:

- Bio LaunchPad Seminar Series
- Keiretsu-Georgia Tech Partnership
- Bench2Market Seminar Series
- VentureLab Summer Launch Program
- Entrepreneurship Assistants Program



## STUDENT OUTREACH AND ENGAGEMENT

### Project ENGAGES (Engaging New Generations at Georgia Tech through Engineering and Science)

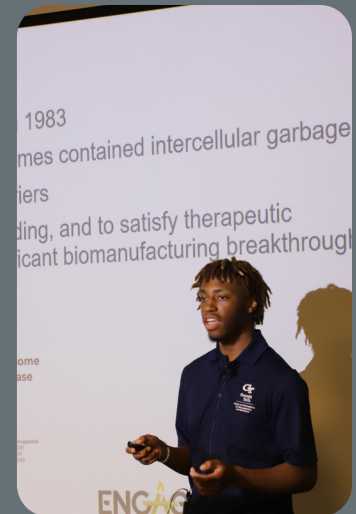
- A unique high school science education/employment program developed at Georgia Tech in partnership with minority-serving high schools in the Atlanta Public Schools
- 165 scholars served since 2013
- Eight partner high schools
- 102 scholars received college scholarships to top-ranked institutions

### Petit Undergraduate Research Scholars

- Program includes hands-on undergraduate research opportunity for one year
- 14 scholars in 2023 from six Atlanta-area universities

### BBUGS (Bioengineering and Bioscience Unified Graduate Students)

- Provides professional education training, outreach, networking events, community service opportunities, BBUGS Pollinator Garden, etc.



# EVENTS

## Events

- In 2023, IBB managed and hosted approximately 400 events with 18,000 attendees
- **Annual IBB Distinguished Lecture**
  - 15th Annual Lecture, *Designer Nanocarriers for Cancer Therapy*, presented by Paula Hammond, Ph.D., Massachusetts Institute of Technology
- **2023 Suddath Symposium**
  - Biomedical Informatics and AI for Biodiscovery and Healthcare
- **Diversity and Inclusion Events**
  - Third Annual Lecture, *Things Fall Apart*, presented by Manu Platt, Ph.D., National Institutes of Health
  - Third Annual Juneteenth Ice Cream Social
- **Georgia Tech Science and Engineering Day | Atlanta Science Festival**
  - Co-organized with multiple Georgia Tech Interdisciplinary Research Institutes to host 1,500+ Atlanta area K-12 students and parents for a fun and educational day of over 40 hands-on science demonstrations across numerous campus buildings
- **Joint Events** – Georgia Tech Neuro Seminars, Achievement Rewards for College Scientists Foundation (ARCS) Annual Scholars Celebration, Atlanta Workshop for Single-cell Omics, Pediatric Tech Talk Webinars, and International Symposium on Medical Robotics



## Marketing and Communications

- BioNEXT Monthly e-Newsletter to the bio community with 12,862 recipients
- BioHIVE Commercialization e-Newsletter with 1,454 recipients
- Social media and articles to amplify research highlights, publications, and awards



## SPOTLIGHT ON SUSTAINABILITY

Sustainability and carbon reduction is an ongoing focus for IBB, exemplified by the Molecular Evolution Core Laboratory's introduction of the TipCycle initiative. This initiative targets the reduction of single-use plastic waste in labs while improving cost efficiency. Embedded within the Biotechnology Skills Development Program, it currently engages six undergraduates and has brought seven labs on board, including the Bio-Teaching Laboratories. To date, TipCycle has successfully cleaned and recirculated over 951,930 pipettes using Grenova Solutions instruments, preventing more than six tons of plastic waste. In addition, the Molecular Evolution Core Lab is among the first to pilot on campus My Green Lab, an international certification program that reduces energy, water, and waste in laboratories.

IBB now offers compostable flatware and utensils with compost collection bins at our events. Through the BBUGS Pollinator Garden and Lights Out Georgia, the IBB community is learning more about urban gardening with native plants and reducing light pollution from laboratories for migrating birds.



## COMMUNITY SPOTLIGHT: IBB'S ANNUAL ART SHOW

In July 2023, IBB hosted its first annual art show, which gave members of the IBB community an opportunity to showcase their artistic talents across various mediums. The art show was a hugely popular event, attended by hundreds across the community. Awards were given in several categories. Two special new awards will be given in the next art show event - the IBB ArtSci and BRAINiArts Awards - to celebrate the most striking and poignant displays of the intersection of art and science.



## Spotlight on IBB's Research Centers

### Cancer Technology Innovation Center (CTIC)

The Cancer Technology Innovation Center's research and technology innovations are helping cancer clinicians better treat each patient as a unique individual, engage and serve all communities, and reduce cancer incidence and increase health after treatment. The Center partners with hospitals and research centers in the Atlanta area, throughout Georgia and the nation, as well as the world, bridging Georgia Tech's world-renowned culture of technology innovation to global cancer care and research.



### Center for Immunoengineering

At the Center for Immunoengineering at Georgia Tech, engineers, chemists, physicists, computational scientists, and immunologists come together to collaboratively understand how the immune system works and find breakthrough solutions to improve the lives of patients suffering from cancer, infectious diseases (e.g. HIV, tuberculosis, hepatitis, polio, etc.), autoimmune and inflammatory disorders (e.g. diabetes, lupus, multiple sclerosis, arthritis, fibrosis, asthma, etc.), as well as those undergoing regenerative therapies (e.g. organ transplantation, spinal cord injury, bone, and cartilage repair, etc.).



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