



**Division of
Science, Technology
& Innovation**

**Centers of Excellence Report
(FY 2016 -2017 & FY 2017-2018)**

Centers of Excellence Report (FY 2016-2017 & FY 2017-2018)

Empire State Development's Division of Science, Technology & Innovation (NYSTAR) manages the Centers of Excellence program with a goal of fostering collaboration between the academic research community and business sector to: develop and commercialize new products and technologies; to promote critical private sector investment in emerging high-technology fields in New York State; and to create and expand technology-related businesses and employment. This program was created to enhance and accelerate the university research centers' operations, facilitating joint university-industry research and development, product commercialization and workforce training.

The Center of Excellence report was previously included in a larger reported that contained information regarding a number of programs run by NYSTAR. This report contains more information than previous NYSTAR reports, while being presented in a summarized manner where information can be gleaned quickly and easily. The information is layout in the following categories:

- Importance to NYS
- Impacts
- Designations and Recognitions
- Operating Budget
- Capital Expenditures
- Commercialization Capabilities and Competencies
- New Products or Processes
- Start-ups Formed
- Licensing Agreements

Center of Excellence in Small Scale Systems Integration and Packaging
Binghamton University
Baghat Sammakia

Importance to NYS

The Center of Excellence in Small Scale Systems Integration and Packaging (S3IP) advances the frontiers of microelectronics research and development, specifically addressing challenges in small scale systems design, development, prototyping, process development and manufacturing for the microelectronics industry. The center increases federal and industry support to Binghamton University and the surrounding area; fosters the success of existing technology companies in the region; and creates cluster effects due to the concentration of research and development in the area of small-scale systems integration packaging and enables economic development in the region by providing a research and development platform that will assist with the creation of new emerging technology companies.

The Small-Scale Systems Integration and Packaging (S3IP) Center of Excellence (the Center) conducts research and development activities to develop new applications and systems which improve people's lives and leads to new product development and commercialization. Successfully building next generation integrated systems requires development of the necessary infrastructure in such leading areas as electronics packaging, flexible electronics, energy efficiencies, solar energy, and new materials and sensors; as well as development of the required analytical and physical models and characterization tools that make a fundamental understanding of these systems possible.

Impacts

Reporting Period	New Jobs	Retained Jobs	Increased Revenues	Cost Savings	Govt Funds	Non-Govt Funds	Capital Improv's	Total Impacts
2017-2018	1	7.5	\$125,000	\$2,522,500	\$375,000	\$100,000	\$250,000	\$3,372,500

2016-17 impacts were included in the 2015-2016 reporting period and published in NYSTAR's last report.

Designations and Recognitions

Year	Awards / Recognition	Recognizing Organization
2016	Associate Director appointed to Board of Directors	Cyber Research Institute
2017	Stan Whittingham re-elected as Vice Chair of Academia for NY-BEST	NY BEST
2018	NorthEast Center for Chemical Energy Storage was re-designated as an Energy Frontier Research Center	Department of Energy

Operating Budget**2017-2018 Reporting Period**

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$656,572	\$659,521	\$1,316,093
Contracting Services	\$0	\$201,519	\$201,519
Travel	\$4,000	\$58,003	\$62,003
Equipment	\$0	\$309,824	\$309,824
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$339,428	\$398,431	\$737,859
Other	\$0	\$0	\$0
Total	\$1,000,000	\$1,627,298	\$2,627,298

2017-2018 Total Federal: \$486,958

2017-2018 Total In-kind: \$0

2016-2017 Reporting Period

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$1,282,482	\$2,124,892	\$3,407,374
Contracting Services	\$0	\$0	\$0
Travel	\$4,185	\$119,680	\$123,865
Equipment	\$19,730	\$132,834	\$152,564
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$512,500	\$742,482	\$1,254,982
Other	\$181,103	\$1,271,828	\$1,452,931
Total	\$2,000,000	\$4,391,716	\$6,391,716

2016-2017 Total Federal: \$2,073,644

2016-2017 Total In-kind: \$0

Capital Expenditures

Equipment Purchases	NYSTAR Funding	Federal	Other Sources	In-kind	Total
Color Digital Copier MPC2503	\$5,215	\$0	\$0	\$0	5,215
Standard touchscreen directory system TO	\$10,678	\$0	\$0	\$0	\$10,678
Scan adapter high performance 10MHz receiver	\$6,600	\$0	\$0	\$0	\$6,600

Commercialization Capabilities and Competencies

At the core of S3IP's relationship with businesses are several essential competencies and capabilities.

First, relative to competencies, the S3IP technical staff are engineers and material scientists with considerable industrial experience, often measured in decades. They "speak the language" of industry and are responsive to the priorities that businesses place on results, budget discipline, and schedule performance. Second, the staff has depth of technical expertise in various aspects of microelectronics manufacturing immediately recognizable by business people. Third, the staff provides liaison with five constituent research centers under the S3IP Center of Excellence umbrella and the deep expertise of associated academic faculty in topics aligned with various aspects of electronics manufacturing topics:

1. Integrated Electronics Engineering Center (IEEC), a NY state CAT with a focus on electronics using chip and die-attach and printed circuit board technologies;
2. Center for Advanced Microelectronics Manufacturing (CAMM), with a focus on electronics printed or assembled onto flexible plastic and glass film substrates, designated as NY node of NextFlex, the national Flexible Hybrid Electronics MII;
3. Energy-Smart Electronics Systems (ES2), an NSF I/UCRC with a focus on energy of efficiency of electronics systems and data centers in particular. ES2 leads this multi-university research center;
4. Northeast Center for Chemical Energy Storage (NECCES), a DOE EFRC with a focus on fundamental research leading to Li-ion batteries with increased capacity and durability; and
5. Center for Autonomous Solar Power (CASP), with a focus on thin-film material systems for energy-harvesting electronics devices such as solar cells, thermocouples, and supercapacitors

Relative to capabilities, S3IP offers infrastructure that businesses in electronics manufacturing and areas of manufacturing immediately recognize as relevant and beneficial to their needs. These include well-equipped and well-staffed laboratories that are available for use by industry or that provide services for engagement by industry. These include the:

- Analytical and Diagnostic Laboratory (ADL), which provides characterization of materials, devices, interfaces, and surfaces in manufactured articles from macroscopic to atomic scales;
- IEEC Failure Analysis Laboratory, which provides environmental testing of manufactured articles (vibration, temperature, heat cycling, humidity effects, electrical performance) to determine failure

modes and prospective improvements to materials, designs, and manufacturing techniques and make recommendations for reliability improvement;

- CAMM Flexible Hybrid Electronics Laboratory, which prototypes the manufacture of electronics on flexible substrates inkjet printing and vacuum lithography techniques;
- Smart Electronics Manufacturing Laboratory, which provides an automated surface-mount electronics assemble capability and prototypes inter-machine communication techniques for improved manufacturing quality and speed;
- Battery Dry Room, which provides an ultra-dry humidity-controlled environment to construct prototype and small lots of Li-ion batteries;
- Nanofabrication Laboratory, operated jointly between the physics department and the S3IP COE to provide a multi-user clean room facility that supports nano-scale fabrication of electronic components via materials deposition techniques;
- CASP Laboratory, which provides equipment for the vacuum deposition and characterization of thin films of materials, typically in energy harvesting applications (e.g., photovoltaics, supercapacitors, and thermocouples);
- ES2 data center laboratory, which is a fully equipped data center (approximately 500 servers) enabling the detailed characterization of energy flows in a data center system and experimentation with advanced cooling and power management software and hardware; and
- StartUp Suite program laboratories, which are furnished, reconfigurable, provisioned, partitioned laboratory spaces available for lease by startup companies.

New Products or Processes

Patent Name	Inventor(s) & Co-Inventors	Invention ID	Summary
Fully Adjustable Airflow Jet Controller	Husam Alissa & Bahgat Sammakia	RB-496, Provisional Patent 62/449,841	Employs a complex tile substructure designed with perforated and rotating veins of variable depths in alternating relative positions.
Control Systems and Prediction Methods for IT Cooling Performance	Husam Alissa & Bahgat Sammakia	RB-497, Provisional Patent 62/449,841	Addresses airflow mismatch by employing flow curves testing methods that describe the exact aerodynamic behavior of the IT.
IT Simulator	Kourosh Nemati, Bruce Murray	RB-499, provisional patent 62/449,834	The novel, 'smart' simulator can be used to vary airflow resistance by adding/removing perforated plates with different airflow resistance, thereby avoiding or reducing the overprovisioning of the cooling infrastructure.
KVOPO4 as Cathode for Sodium Ion Batteries	M. Stanley Whittingham	RB-506, Provisional Patent 62/355,639	A new material was synthesized and performed as a cathode for sodium ion batteries. It is a multi-electron cathode which can store more than one sodium ion during a single charge/discharge process.
Synthesis of Cathode Material	M. Stanley Whittingham	Patent Number: 9,722,247	Optimized synthetic techniques which utilize more appropriate reaction method, starting materials, reactant ration and pH value to make better H2VOPO4 precursors.
Solid State Integrated Gamma X-ray and Particle Detector (2 patents)	James Turner with co-inventors: Mark Poliks, Steven Czarnecki	Patent Numbers: 9,835,737 & 9,606,245	Eencompasses novel scintillator detectors and detection methods utilizing advanced integrated silicon photomultiplier (SIPM) arrays, logic, and memory as key components of an improved (3rd generation) portable and fieldable 3D brain Positron Emmission Tomography (PET) imaging camera system.

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Dual Ended Readout TOF-PET and DOI	James Turner	N/A	An improved gamma ray detector for positron emission tomography and for more general high energy particle detectors including x-rays, gamma rays and high energy particles, in terms of higher sensitivity and resolution.
Control Systems and Prediction Methods for IT Cooling Performance	Husam Alissa with co-inventors: Bahgat Sammakia	Non-Provisional Patent Number: 15/879,163	Addresses airflow mismatch by employing flow curves testing methods that describe the exact aerodynamic behavior of the IT. The passive flow curve method (PFC) describes the passive airflow.
Vanadyl Phosphates as High Energy Density Cathode Materials	Stan Whittingham with co-inventors: Carrie Siu	Provisional Patent Number: 62/638,893	The invention encompasses the use of vanadyl phosphate (ϵ -VOPO ₄) as a candidate material whose stable 3D tunnel structure can enable it to store and deliver more energy in next-generation lithium- or sodium-ion battery systems.

Start-up Companies Formed

Not Reported

Licensing Agreements

Not Reported

**Center of Excellence in Precision Responses to Bioterrorism and Disaster
New York Medical College
Dr. David Markenson**

Importance to NYS

The Center for Excellence in Precision Responses to Bioterrorism and Disasters at New York Medical College seeks to translate research findings in order to protect Americans from the threat of catastrophic bioterrorism, mass casualty incidents and natural and man-made disasters. This center will increase the medical and public health readiness of the State of New York and will be a national and international leader in the development of science and innovation to minimize the morbidity and mortality of victims of catastrophic disasters, pandemics, and acts of terror.

This center integrates the college’s globally recognized assets in disaster medicine and medical countermeasures with individualized precision medical strategies for combating human exposure to nuclear, chemical and biological hazards. The center uses evidence-based medicine and lessons learned from military medicine to educate and train both clinicians and first responders to provide the highest quality care to all victims of mass casualty events both at home and abroad. This center has three principal focus areas.

1. Education and training of clinicians, health professionals, and first responders in the most effective ways to treat victims of disasters, terrorism and public health emergencies.
2. The development, evaluation, and dissemination of biomedical countermeasures for agents of mass destruction including nuclear, chemical, and biological threats.
3. Utilization of precision medicine to develop patient-specific treatments and responses to ill and injured victims of all types of disasters, acts of terrorism, and public health emergencies.

Impacts

This CoE executed their initial contract in late November 2017. No Impacts were reported for the reporting periods covered by this report, because this center was still in the process of ramping up their operations.

Designations and Recognitions

Year	Awards / Recognition	Recognizing Organization
2018	Accreditation as a NAEMT Training Sponsor and Center	National Association of Emergency Medical Technicians

Operating Budget

2017-2018 Reporting Period

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$240,910	\$590,395	\$831,305
Contracting Services	\$30,800	\$0	\$30,800
Travel	\$3,000	\$11,250	\$14,250
Equipment	\$153,916	\$53,000	\$206,916
Space/Property & Utilities	\$0	\$2,000	\$2,000
Operating Expenses	\$36,137	\$2,511	\$38,648
Other	\$35,237	\$141,008	\$176,245
Total	\$500,000	\$800,164	\$1,300,164

2017-2018 Total Federal: \$0

2017-2018 Total In-kind: \$0

2016-2017 Reporting Period

This center was designated in fiscal year 2017-2018

Capital expenditures

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Capital Equipment Purchases	NYSTAR Funding	Federal	Other Sources	In-kind	Total
Physio Control Inc	\$37,895	\$0	\$0	\$0	\$0
Fujifilm Sonosite Inc	\$21,200	\$0	\$0	\$0	\$0

Commercialization Capabilities and Competencies

First Year of Operation – Finalizing their Commercialization Capabilities and Competencies (which includes capabilities and competencies) for 2018-2019 reporting period.

New Products or Processes

Not Reported

Start-up Companies Formed

Not Reported

Licensing Agreements

Not Reported

**Center of Excellence in Sustainable Manufacturing
Rochester Institute of Technology
Dr. Michael Thurston**

Importance to NYS

The NY State Center of Excellence in Sustainable Manufacturing (COE-ASM) is dedicated to helping New York State manufacturers develop and apply new technologies that create competitive business advantages. This CoE is leading industrial sustainability research and development through industry collaboration initiatives focused on the deployment of new technologies for more efficient and sustainable products and processes.

The research and development focus of this center is three-fold:

1. Reducing manufacturing energy intensity;
2. Reducing product material and energy intensity over the life-cycle; and
3. Developing smart product and process technologies to improve product and process efficiency and effectiveness.

Activities include applied research to address common technology problems, supply chains integration, comprehensive metrics for sustainable manufacturing, technology proof of concept demonstration and evaluation, and technology deployment and commercialization support. Deployment activities include but are not be limited to: licensing of technology that results from research, technical and economic assessments for candidate technologies, support for sustainability score-cards and supply chains, and technical training (e.g., training in sustainable design).

Impacts

Reporting Period	New Jobs	Retained Jobs	Increased Revenues	Cost Savings	Govt Funds	Non-Govt Funds	Capital Improv's	Total Impacts
2017-2018	32	47.3	\$1,270,276	\$112,231	\$1,555,579	\$472,439	\$292,676	\$3,703,201
2016-2017	27	179	\$992,947	\$300,450	\$255,292	\$328,000	\$340,800	\$2,217,579

Designations and Recognitions

Not Reported

Operating Budget**2017-2018 Reporting Period**

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$806,357	\$444,855	\$1,251,212
Contracting Services	\$5,000	\$10,000	\$15,000
Travel	\$10,000	\$5,000	\$15,000
Equipment	\$15,000	\$15,000	\$30,000
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$163,643	\$525,145	\$688,788
Other	\$0	\$0	\$0
Total	\$1,000,000	\$1,000,000	\$2,000,000

2017-2018 Total Federal: \$552,387

2017-2018 Total In-kind: \$0

2016-2017 Reporting Period

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$810,803	\$447,829	\$1,258,632
Contracting Services	\$5,000	\$12,000	\$17,000
Travel	\$15,000	\$5,000	\$20,000
Equipment	\$12,000	\$15,000	\$27,000
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$157,197	\$520,171	\$677,368
Other	\$0	\$0	\$0
Total	\$1,000,000	\$1,000,000	\$2,000,000

2016-2017 Total Federal: \$857,087

2016-2017 Total In-kind: \$0

Capital expenditures

None

Commercialization Capabilities and Competencies

Center researchers include full-time research staff and academic faculty at the Golisano Institute for Sustainability (GIS) at Rochester Institute of Technology (RIT), as well as leveraged resources from the broader RIT community. The majority of project work is performed or led by the full-time researchers at GIS. These personnel have significant industry experience in product development and manufacturing. This industry experience, combined with technical depth in a variety of engineering and science disciplines, results in a successful formula for collaboration with our client companies on development and commercialization opportunities. Specific areas of technical expertise include: product design, model-based engineering, systems engineering, sustainability, manufacturing processes, remanufacturing and repair, fuel cells and energy systems, software development, wireless technologies, and advanced analytics.

COE-ASM leverages the capabilities of six other applied research centers at GIS, spanning all major areas of industrial sustainability including energy, transportation, mobility, built environment and manufacturing. The center also has access to over 225,000 square feet of laboratories and testbeds designed for specific technology development. These facilities support digital manufacturing and smart systems technologies, biofuels and fuel cell development, electro-mechanical prototyping and integration, materials analysis, vehicle technology development, and smart building technology integration.

New Products or Processes

Not Reported

Start-up Companies Formed

Not Reported

Licensing Agreements

Not Reported

**Center of Excellence in Advanced Energy Research Center
Stony Brook University
David Hamilton**

Importance to NYS

Stony Brook Universities Center of Excellence in Advanced Energy Research (AERTC) promotes cutting edge research and development by leveraging project funding from federal and state sources and through industry collaborations. The AERTC works to accelerate commercialization of new efficiency and renewable technologies by supporting development of start-ups and energy companies at all stages of growth.

AERTC is a true partnership of academic institutions, research institutions, energy providers and industrial corporations. The center's mission is innovative energy research, education and technology deployment with a focus on efficiency, conservation, renewable energy and nanotechnology applications for new and novel sources of energy.

Impacts

Reporting Period	New Jobs	Retained Jobs	Increased Revenues	Cost Savings	Govt Funds	Non-Govt Funds	Capital Improv's	Total Impacts
2017-2018	7.5	10.5	\$320,000	\$60,000	\$416,420	\$3,378,119	\$2,085,000	\$6,259,539
2016-2017	8	14	\$3,800,000	\$350,000	\$849,583	\$150,000	\$41,250	\$5,190,833

Designations and Recognitions

Not Reported

Operating Budget**2017-2018 Reporting Period**

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$847,000	\$0	\$847,000
Contracting Services	\$0	\$106,650	\$106,650
Travel	\$0	\$3,850	\$3,850
Equipment	\$0	\$25,000	\$25,000
Space/Property & Utilities	\$26,000	\$638,500	\$664,500
Operating Expenses	\$127,000	\$226,000	\$353,000
Other	\$0	\$0	\$0
Total	\$1,000,000	\$1,000,000	\$2,000,000

2017-2018 Total Federal: \$0

2017-2018 Total In-kind: \$0

2016-2017 Reporting Period

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$847,000	\$0	\$847,000
Contracting Services	\$0	\$106,650	\$106,650
Travel	\$0	\$3,850	\$3,850
Equipment	\$0	\$25,000	\$25,000
Space/Property & Utilities	\$26,000	\$638,500	\$664,500
Operating Expenses	\$127,000	\$226,000	\$353,000
Other	\$0	\$0	\$0
Total	\$1,000,000	\$1,000,000	\$2,000,000

2016-2017 Total Federal: \$0

2016-2017 Total In-kind: \$0

Capital expenditures

Not Reported

Commercialization Capabilities and Competencies

The AERTC is a two-story, 45,000 sf facility specialized and flexible laboratory facilities, office space and conference rooms. Consistent with its mission, the focus and construction of the Energy Center facility is to incorporate multiple energy sustainable design principles. It is the first LEED Platinum-designed research facility in the State of New York organized around core and flexible laboratories which support the main energy research thrusts.

The Center's traditional labs, the high-bay lab, and the outdoor spaces support research at different stages from nano-scale to pilot plant to real-life simulation: all in an energy-forward building. From site selection and stormwater runoff control, building construction management and the materials used, to water usage reduction and energy efficient lighting, the Center promotes energy efficiency at its maximum.

New Products or Processes

Not Reported

Start-up Companies Formed

Not Reported

Licensing Agreements

Not Reported

Center of Excellence in Wireless and Information Technology
Stony Brook University
Satya Sharma

Importance to NYS

The Center of Excellence in Wireless and Information Technology (CEWIT) at Stony Brook University is a next generation research and educational facility whose mission is three-fold: become recognized as a world leader in interdisciplinary research in the emerging, critical technologies of the information age, address the skilled technology worker shortage, and foster new enterprise development.

CEWIT's mission is to lead, initiate, foster, and manage the transfer of technologies from the research laboratory to the marketplace, and to facilitate interaction between companies and university faculty and students. Their competencies include:

- Attracting industry partners to further develop university discoveries and inventions
- Maximizing the commercial potential of university technologies
- Initiating and supporting the growth of start-ups based on promising technologies
- Generating industrial and financial support for applied projects
- Facilitating collaborative industry research and development programs
- Becoming a know-how center of wireless and information technologies for New York State companies
- Directing commercialization and marketing efforts

Impacts

Reporting Period	New Jobs	Retained Jobs	Increased Revenues	Cost Savings	Govt Funds	Non-Govt Funds	Capital Improv's	Total Impacts
2017-2018	14.5	16	\$10,857,534	\$30,000	\$1,161,024	\$322,050	\$6,028	\$12,376,636
2016-2017	86	192	\$19,139,861	\$1,030,000	\$903,672	\$765,000	\$7,062,500	\$28,901,033

Designations and Recognitions

Not Reported

Operating Budget**Reporting Period 2017-2018**

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$1,739,130	\$0	\$1,739,130
Contracting Services	\$0	\$0	\$0
Travel	\$0	\$0	\$0
Equipment	\$0	\$0	\$0
Space/Property & Utilities	\$0	\$2,000,000	\$2,000,000
Operating Expenses	\$260,870	\$0	\$260,870
Other	\$0	\$0	\$0
Total	\$2,000,000	\$2,000,000	\$4,000,000

2017-2018 Total Federal: \$0

2017-2018 Total In-kind: \$0

Reporting Period 2016-2017

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$869,565	\$0	\$869,565
Contracting Services	\$0	\$0	\$0
Travel	\$0	\$0	\$0
Equipment	\$0	\$0	\$0
Space/Property & Utilities	\$0	\$1,000,000	\$1,000,000
Operating Expenses	\$130,435	\$0	\$130,435
Other	\$0	\$0	\$0
Total	\$1,000,000	\$1,000,000	\$2,000,000

2016-2017 Total Federal: \$0

2016-2017 Total In-kind: \$0

Capital Expenditures

Not Reported

Commercialization Capabilities and Competencies

CEWIT has two main purposes: conduct research and commercialize it. Stony Brook University is the most active and successful technology transfer campus in the State University system, generating more than 90% of the aggregate licensing revenues of SUNY's 64 campuses and consistently placing, as a campus, in the top twenty tech transfer institutions nationally, according to the annual survey of the Association of University Technology Managers. Through its "end-to-end" suite of economic development programs, Stony Brook has assisted in the creation or retention of a projected total exceeding 17,000 jobs through more than 2,500 projects with more than 600 New York companies.

CEWIT's 100,000 square foot facility has 40 laboratories, a state-of-the-art data center with multiple high performance clusters, an optical network infrastructure, a lecture and meeting center, and videoconference facilities, as well as all customary laboratory infrastructure. Since its inception, more than 430 projects have been completed with industry partners and more than 250 projects have been completed for a wide range of federal and state agencies. Over 130 invention disclosures have been filed and more than 40 US patents have been issued, 25 of which have been licensed by the Center's industry partners. During the same period, CEWIT researchers have produced over 720 research publications. In addition, CEWIT has successfully organized an annual international conference on emerging technologies since 2003.

CEWIT has research and development strengths in a wide range of areas that are best aligned with a number of target industry sectors, including but not limited to, healthcare and medical technologies, transportation and logistics, finance and e-commerce, homeland security and national defense, energy and utilities, among others. To assure growth and job creation in all targeted industry segments, there are certain technologies that are essential for improving the productivity of the companies in these segments and creating growth and job opportunities for people in our region and our State.

New Products or Processes

Reporting Period	Patent Name	Inventor & Co-Inventors	Invention ID
2016-2018	System and Method for Context Preserving Maps Of Tubular Structures	Arie Kaufman	9792729
2016-2018	Attenuated Viruses Useful for Vaccines	Steven Skiena	287882
2016-2018	Apparatus and Method for Optimal Phase Balancing Using Dynamic Programming with Spatial Consideration	Steven Skiena	9,728,971

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2016-2018	System and Method for Block Chain-Based Data Management and Sharing for Healthcare Data	Fusheng Wang	62/446,967
2016-2018	System and Method for Block Chain-Based Data Management and Sharing for Healthcare Data	Fusheng Wang	62/448,458
2016-2018	In-Memory Scalable Spatial Analytics on Large Scale 3D Data	Fusheng Wang	62/456,464
2016-2018	System and Method for Generating a Progressive Representation Associated with Subjectively Mapped Virtual and Physical Reality Image Data	Arie Kaufman	PCT/US2017/027603
2016-2018	System and Method for Data Access Interface	Klaus Mueller	62/514,299
2016-2018	System and Method for Pancreatography	Arie Kaufman	62/524,819
2016-2018	System and Method for Scalable Integrative Geocoder	Fusheng Wang	62/524,127
2016-2018	System and Method for Identifying, Managing, and Displaying Connections Between User and Content	Satya Sharmam, Rong Zhao	62/528,190
2016-2018	System and Method for Construction of Hierarchies from Multivariate Data	Klaus Mueller	62/530,944
2016-2018	Reality Deck	Arie Kaufman, Klaus Mueller, Dimitrios Samaras	97418834
2016-2018	System and Method for Generating a Progressive Representation Associated with Subjectively Mapped Virtual and Physical Reality Image Data	Arie Kaufman	15/564,145
2016-2018	Attenuated Viruses useful for Vaccines	Steven Skiena	201748034299

Start-up Companies Formed

Not Reported

Licensing Agreements

Two agreements were executed (one non-exclusive license and one option exercised). CEWIT was informed by the University technology licensing office that it does not disclose the title, description, and inventor information of such agreements.

Center of Excellence in Nanoelectronics
SUNY Polytechnic
Dr. Fatemeh Shahedipour-Sandvik

Importance to NYS

The SUNY College of Nanoscale Science and Engineering Center of Excellence in Nanoelectronics & Nanotechnology (CENN) leverages the combined resources of pre-competitive, private-public, consortia for R&D and workforce training to establish New York as the most effective and attractive location for nanotechnology-enabled industries; including but not limited to, defense and civilian nanoelectronics; ultrafast ultra secure communications; renewable environmentally-friendly energy sources; nanobiotechnology; nanoeconomics; and nanomedicine. CENN's mission includes serving as a platform for implementation of innovative real-time educational programs to train a critical pool of highly qualified scientists, engineers, and technicians to support the continually developing needs of the nanoelectronics industry.

CENN is a fully integrated technology deployment, product prototyping, manufacturing support, and workforce training resource for emerging generations of integrated circuitry (IC). Its targeted portfolio of nanoelectronics-based products ranges from emerging microprocessor and memory computer chips with higher functionality and complexity, to the rapidly evolving areas of micro- and nanosystem based "systems-on-a-chip" (SOC) technologies, including biochips, optoelectronics and photonics devices, and nanosensors for energy and the environment.

Impacts

Reporting Period	New Jobs	Retained Jobs	Increased Revenues	Cost Savings	Govt Funds	Non-Govt Funds	Capital Improv's	Total Impacts
2017-2018	5	0	\$413,940	\$94,265,667	\$0	\$0	\$0	\$94,679,607
2016-2017	5	11	\$456,382	\$888,205	\$19,245,575	\$0	\$50,698	\$20,640,860

Designations and Recognitions

Not Reported

Operating Budget**2017-2018 Reporting Period**

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$511,000	\$0	\$511,000
Contracting Services	\$200,000	\$0	\$200,000
Travel	\$20,000	\$0	\$20,000
Equipment	\$0	\$0	\$0
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$76,650	\$0	\$76,650
Other	\$192,350	\$1,000,000	\$1,192,350
Total	\$1,000,000	\$1,000,000	\$2,000,000

2017-2018 Total Federal: \$0

2017-2018 Total In-kind: \$0

2016-2017 Reporting Period

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$679,574	\$870,395	\$1,549,969
Contracting Services	\$53,000	\$0	\$53,000
Travel	\$0	\$0	\$0
Equipment	\$117,000	\$0	\$117,000
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$101,936	\$130,559	\$232,495
Other	\$48,490	\$0	\$48,490
Total	\$1,000,000	\$1,000,954	\$2,000,954

2016-2017 Total Federal: \$0

2016-2017 Total In-kind: \$0

Capital expenditures

Capital Equipment Purchases	NYSTAR Funding	Federal	Other Sources	In-kind	Total
Flexcell FX5000 Tension System	\$42,641	\$0	\$0	\$0	\$42,641
AKTA Pure Chromatography System	\$70,026	\$0	\$0	\$0	\$70,026

Commercialization Capabilities and Competencies

CENN manages an industry compliant manufacturing scale-up fabrication facilities and capabilities in 300 mm wafer advanced CMOS and derivatives, 300mm wafer integrated photonics, and most recently 150 mm wafer silicon carbide power electronics.

The CENN has been central to establishing a statewide next-generation, nanotechnology-enabled open innovation business model that has successfully attracted leading small, medium and large-sized companies from around the world. Today the CENN oversees state-of-the-art facilities that support a broad array of technology development programs in partnership with over 300 small and large industry leaders resulting in the more than 3,275 scientists, researchers, engineers, students, and faculty all working on the Albany complex. With the CENN's unique co-location model, global industry leaders include growing clusters in nanoelectronics (e.g. IBM, Global Foundries, Samsung, Applied Materials, Tokyo Electron, ASML, LAM, and Atotech, among many others), design engineering (e.g. EYP, M+W Group, DPS, Danforth, and CHA), data sciences (e.g. CommerceHub, IEEE/Global Spec, NY Wired for Education, Windstream, NYS-ITS, NYPA, among others), all represent direct economic impact for New York State.

The CENN is responsible for the management and operation of world-class tools and infrastructure at SUNY Poly CNSE's \$15 billion mega-complex consisting of over 1,600,000ft² of office, laboratories, classrooms with 135,000ft² of cleanrooms housing the world's most advanced 300mm Si wafer, 150mm SiC wafer pilot-prototype, manufacturing scale-up and high volume manufacturing (HVM) fabrication lines. More specifically, the CENN has focused its activities and expertise on utilizing advanced nano-processing to enable the commercialization of innovative nanotechnologies, including CMOS devices, Silicon Carbide (SiC) wafer fabrication, and silicon-based processes for emerging applications in energy storage, photovoltaics, biohealth, and many others.

New Products or Processes

Reporting Period	Patent Name	Inventor & Co-Inventors	Invention ID
2016-2017	Laser Die Attach to Interposer for Photonics	Douglas Coolbaugh, Michael Watts, Michael Lipson, Keren Bergman, Thomas Koch, Jeremiah Hebding,	62/426,100

Centers of Excellence Report (FY 2016-2017 & FY 2017-2018)

2016-2017	Use of Vascular Cells to Create the Conventional Outflow Track	Yubing Xie, Karen Torrejon, Magnus Bergkvist, Susan Sharfstein, John Danias	62/286,760 and 62/286,743 filed together
2016-2017	1-D Optical Position Sensitive Detector Using Array of Back-to-back Connected Photodiodes	Leigh Lydecker, Natalya Tokranova, James Castracane	62/182,713
2016-2017	Coupled plasmonics enabled chemical sensors and thermal energy harvesting structures	Michael Carpenter	PCT/US/35798
2017-2018	Method and Instrumentation for the Rapid Determination of Spatial Distribution of Charged Particle Beams	Eric Lifshin and Yudhishthir Kandel	9,754,360
2017-2018	Branched Nanostructures for Battery Electrodes	Jae Ho Lee, Issac Lund	2609648
2017-2018	Integrated Photonics Including Germanium	Douglas Coolbaugh, Gerald Leake, Thomas Adam	9,864,138
2017-2018	Method and Structure for Integrating Photonics with CMOS	Christopher Biaocco, Douglas Coolbaugh, Gerald Leake	9,874,693
2017-2018	Optical Fiber Attach to Interposer for Photonics Applications	Douglas Coolbaugh, Douglas LaTulipe, Jeremiah Hebding	62/509,494
2017-2018	Metabolically competent cells, Methods of Making	Abderrahamme Tagmount, Amin Sobh, Christopher Vulpe, David Faulkner, Michael Fasullo	PCT/US17/41202
2017-2018	Peptide Activators of Protein Tyrosine Phosphate 1B	Benoit Boivin, Nicholas Tonks	62/535,430
2017-2018	Integrated Photonics Including Germanium and Integrated Photonics Including Waveguiding Material	Douglas Coolbaugh, Gerald Leake, Thomas Adam	15/864,651
2017-2018	Wafer Scale Bonded Active Photonics Interposer	Douglas Coolbaugh, Douglas LaTulipe, Gerald Leake	PCT/US18/17558

Start-up Companies Formed

Not Reported

Licensing Agreements

Not Reported

Center of Excellence in Environmental and Energy Systems
Syracuse University
Dr. Edward Bogucz

Importance to NYS

The Syracuse Center of Excellence in Environmental and Energy Systems (the Center) targets research in built environments and urban ecosystems at Syracuse University (“SU”) and its academic partners, working in collaboration with the commercialization and business development expertise of the CenterState Corporation for Economic Opportunity (“CenterState CEO”). Research in built environmental systems includes indoor air quality, thermal comfort, lighting, acoustics, energy efficiency, renewable energy, and intelligent control systems. Research in the area of urban ecosystems includes activities relating to renewable resources, ambient air quality, water resource management, waste management, transportation, and sustainable development. This research is leading to the development of new products, technologies, and services that will enhance New York State’s ability to respond quickly and appropriately to environmental threats or attacks, ameliorate disease, boost worker productivity, develop new strategies to conserve energy, and create jobs. The concentration of the center is to support business development efforts which result in driving revenue into the Center and support regional economic development.

Impacts

Reporting Period	New Jobs	Retained Jobs	Increased Revenues	Cost Savings	Govt Funds	Non-Govt Funds	Capital Improv's	Total Impacts
2017-2018	12.5	21.5	\$70,000	\$0	\$59,000	\$59,000	\$213,473	\$401,473
2016-2017	25	59	\$3,160,801	\$15,000	\$200,000	\$364,510	\$494,218	\$4,234,529

Designations and Recognitions

Not Reported

Operating Budget**2017-2018 Reporting Period**

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$737,257	\$259,403	\$996,660
Contracting Services	\$72,000	\$20,000	\$92,000
Travel	\$21,700	\$0	\$21,700
Equipment	\$5,000	\$0	\$5,000
Space/Property & Utilities	\$0	\$31,556	\$31,556
Operating Expenses	\$110,588	\$548,041	\$658,629
Other	\$53,455	\$141,000	\$194,455
Total	\$1,000,000	\$1,000,000	\$2,000,000

2017-2018 Total Federal: \$95,867

2017-2018 Total In-kind: \$0

2016-2017 Reporting Period

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$721,501	\$177,776	\$899,277
Contracting Services	\$30,000	\$42,100	\$72,100
Travel	\$32,000	\$0	\$32,000
Equipment	\$38,000	\$0	\$38,000
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$108,225	\$639,124	\$747,349
Other	\$70,274	\$141,000	\$211,274
Total	\$1,000,000	\$1,000,000	\$2,000,000

2016-2017 Total Federal: \$0

2016-2017 Total In-kind: \$0

Capital expenditures (include Federal State, local funds & in-kind)

Capital Equipment Purchases	NYSTAR Funding	Federal	Other Sources	In-kind	Total
Radiometry Thermal Image camera	\$3,000	\$0	\$0	\$0	\$3,000

Commercialization Capabilities and Competencies

Not Reported

New Products or Processes

Reporting Period	Patent Name	Inventor & Co-Inventors	Invention ID
2016-2017	Heliohex LED Lighting	Adam Milan	20170030566A1
2016-2017	Continuous Flow Fluid Contaminant Sensing System	John Merrill, Quansor Corp., Eric Becks, Alex Waldrop	Not available

Start-up Companies Formed

Not Reported

Licensing Agreements

Not Reported

Center of Excellence in Atmospheric and Environmental Prediction and Innovation
University at Albany
Drs. Chris Thorncroft and Everett Joseph

Importance to NYS

The Center of Excellence in Atmospheric and Environmental Prediction and Innovation is focused on high impact weather monitoring and prediction research as well as product and services development and commercialization aimed at better understanding of the causes of high impact weather in New York State, as well as the kinds of changes expected in the future as a result of climate change. In collaboration with strategic partners, this CoE will improve New York State's resilience in the face of high impact weather events through new technologies and better decision-making. This center supports businesses by: (1) driving growth in commercial revenue from both large and small commercial customers; (2) increasing competitively awarded research and development grants; and, (3) increasing collaborations with faculty and leveraging new campus developments. The CoE pursues a multidisciplinary economic development strategy that reaches the sectors of energy, agriculture, transportation, forensics (insurance), health, tourism, and finance/commerce.

Impacts

Reporting Period	New Jobs	Retained Jobs	Increased Revenues	Cost Savings	Govt Funds	Non-Govt Funds	Capital Improv's	Total Impacts
2017-2018	4	1	\$1,150,051	\$172,000	\$0	\$0	\$0	\$1,322,051
2016-2017	2	1	\$750,000	\$783,000	\$50,000	\$0	\$0	\$1,583,000

Designations and Recognitions

Not Reported

Operating Budget**Reporting Period 2016-2018**

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$270,745	\$57,600	\$328,345
Contracting Services	\$20,000	\$0	\$20,000
Travel	\$25,000	\$0	\$25,000
Equipment	\$19,250	\$0	\$19,250
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$40,612	\$105,591	\$146,203
Other	\$124,393	\$160,190	\$284,583
Total	\$500,000	\$323,381	\$823,381

*** Contract was not signed until 10/2017 so the reporting period covers two years

2016-2018 Total Federal: \$0

2016-2018 Total In-kind: \$0

Capital expenditures

Not Reported

Commercialization Capabilities and Competencies

The Center has a robust cadre of associated faculty and staff who have skills and expertise to address most atmospheric sciences research problems. Like how the weather (atmospheric sciences) affects nearly every sector, the Center is forming relationships with nearly every academic department at the University at Albany. The University employees key opinion leaders in Atmospheric Sciences, Business, Transportation, Public Policy, Actuarial Sciences, Public Health, Computer Sciences and Engineering.

Human capital is the Center's most valuable asset because a majority of weather-based products and solutions are built using a combination of hardware and custom software. As such the Center has access to the necessary equipment, computing resources, and/or expertise to develop a variety of weather solutions. Infrastructure of importance includes:

- **Big Weather Web (BWW):** The BWW is "a common and sustainable big data infrastructure in support of weather prediction research and education in universities." The BWW is an NSF funded project led by nine of the leading atmospheric sciences universities, with the goal of improving weather prediction by "combining the application of three recent technologies virtualization, federated smart storage and big data management";
- **Research Groups/Labs:** The University has labs devoted to developing innovative solutions across many disciplines within atmospheric sciences. These labs specifically focus on: Microphysics of Aerosols and Cloud Droplets; Boundary Layer Meteorology; Environmental and Radiative Energy Exchange; Surface-Atmosphere Exchange; Atmospheric Chemistry; Instrumentation and Analytical Methods; Mesoscale Meteorological Modeling; Climate Systems Sciences; and Renewable Energy;
- **Whiteface Mountain Observatory:** The Observatory's mission is to enhance our fundamental understanding of the chemical and physical nature of the atmosphere, and to apply that knowledge to study the interaction of chemical, physical, geological, and biological processes impacting our environment;
- **Mobile Measurement Platforms:** The Center has access to a myriad of weather instruments that can be placed at any location to assess the specific weather phenomena's economic impact at that location. These instruments can be placed at, or near most business locations or locations that affect business profits or operations;
- **New York State Mesonet:** The New York State Mesonet is a network of 126 weather stations across the state, with at least one site in every county. Each site will measure temperature, humidity, wind speed and direction, pressure, radiation, and soil information. Special subsets of 17 sites will provide additional atmospheric data in the vertical (up to 2 miles above ground), flux (the amount of heat and moisture exchange near the ground) and snow depth information; and
- **The University has a super computing cluster that atmospheric sciences faculty use to conduct research.** The cluster enables atmospheric sciences faculty to conduct large-scale atmospheric modeling projects that can benefit Center business partners.

New Products or Processes

Not Reported

Start-up Companies Formed

Not Reported

Licensing Agreements

Not Reported

Center of Excellence in Bioinformatics and Life Sciences (CBLS)
University of Buffalo
Dr. Norma Nowak

Importance to NYS

The University at Buffalo's New York State Center of Excellence in Bioinformatics and Life Sciences (CBLS) is home to internationally recognized faculty and industry partners with assets/resources to drive both scientific innovation and economic growth. Researchers study the mechanistic processes involved in human disease; and the envisioned research is expected to include development of new diagnostic tools and therapeutic interventions, preventative treatments and other devices and processes which improve the population's health. CBLS leverages the university's expertise and cutting-edge capabilities in genomics, bioinformatics, proteomics, bioanalysis and supercomputing to partner with industry to drive life sciences innovation and to commercialize new technologies that strengthen the region's and the state's economies. This CoE helps launch new companies, grow existing firms, and attract relocating and expanding businesses.

Impacts

Reporting Period	New Jobs	Retained Jobs	Increased Revenues	Cost Savings	Govt Funds	Non-Govt Funds	Capital Improv's	Total Impacts
2017-2018	136	10	\$2,951,944	\$5,217,300	\$6,729,326	\$10,727,260	\$1,225,200	\$26,851,030
2016-2017	236	0	\$2,741,500	\$2,245,725	\$2,151,649	\$25,586,302	\$2,338,148	\$35,063,324

Designations and Recognitions

Year	Awards / Recognition	Recognizing Organization
2016	Science Education Partnership Award	National Institute of Health

Operating Budget**2017-2018 Reporting Period**

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$662,795	\$0	\$662,795
Contracting Services	\$125,000	\$0	\$125,000
Travel	\$16,500	\$0	\$16,500
Equipment	\$23,000	\$570,000	\$593,000
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$99,420	\$430,000	\$529,420
Other	\$73,286	\$0	\$73,286
Total	\$1,000,000	\$1,000,000	\$2,000,000

2017-2018 Total Federal: \$0

2017-2018 Total In-kind: \$0

2016-2017 Reporting Period

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$662,795	\$0	\$662,795
Contracting Services	\$125,000	\$0	\$125,000
Travel	\$16,500	\$0	\$16,500
Equipment	\$23,000	\$570,000	\$593,000
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$99,420	\$430,000	\$529,420
Other	\$73,286	\$0	\$73,286

Centers of Excellence Report (FY 2016-2017 & FY 2017-2018)

Total	\$1,000,000	\$1,000,000	\$2,000,000
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2016-2017 Total Federal: \$0

2016-2017 Total In-kind: \$0

Capital expenditures

Not Reported

Commercialization Capabilities and Competencies

The CBLS is home to over 250 scientists and research staff with biological, physical and computational expertise, all of whom are engaged in interdisciplinary biomedical research with collaborators from across the region, the country and the globe. CBLS faculty members are affiliated with our primary research partners including the University at Buffalo, Roswell Park Cancer Institute, and the Hauptmann-Woodward Medical Research Institute.

They specialize in the below target industry clusters: Drug Discovery and Development; Diagnostics; Medical Devices; Healthcare IT; and Genomics / Personalized Medicine.

The CBLS is a hub for life sciences innovation, big data analytics, and technology-based economic development driving scientific discovery and facilitating collaboration among academia, industry and the public sector. The Center is located in the heart of the Buffalo Niagara Medical Campus (BNMC)—a world-class medical campus for clinical care, research, education and entrepreneurship. This “coatless campus” allows easy travel to key research partners on the BNMC, which include Roswell Park Cancer Institute, Hauptman-Woodward Institute, Buffalo General Medical Center and UB’s Clinical and Translational Research Center (CTRC).

The CBLS with its 19,000 square feet of office space, 4,600 square feet of meeting space and 25,000 square feet of BSL2 designated lab space is home to multidisciplinary faculty and companies. It houses three core facilities that offer services and expertise in high performance computing, genomics, massively parallel sequencing, proteomics, bioanalysis and bioinformatics. The CBLS is unique in that respect wherein the cornerstone technologies, high performance computing power and Bioinformatics resources, all necessary for Omics studies are housed in a single physical location. Researchers and industry partners find this comprehensive offering invaluable to further their respective R & D goals.

New Products or Processes

Reporting Period	Patent Name	Inventor	Patent Number	Description
2016-2017	Reducing Antigen-Specific Immunogenicity	Sathy Balu-Iyer, Matthew P. Kosloski	011520.01188	Composition of less immunogenic protein formulation
2016-2017	Treatment or Prevention of Multiple Sclerosis	Sathy Balu-Iyer, Murali Ramanathan, Fiona Yau	011520.01198	Phosphatidylserine particles for treating autoimmune conditions
2016-2017	Oral Compositions and Methods for Immune Tolerance Induction	Sathy Balu-Iyer, Richard. Bankert, Radha Dingman Ramakrishnan	011520.01190	Oral tolerance using Phosphoserine containing formulations
2016-2017	Phosphoserine Containing Compositions for Immune Tolerance Induction	Sathy Balu-Iyer, Richard. Bankert, Radha Dingman Ramakrishnan, Robert Iyer,	011520.01189	
2016-2017	Electrochemical Eradication of Microbes on Surfaces of Objects	Anthony A Campagnari, Richard Bankert, Radha Dingman Ramakrishnan, Robert, Vandana Iyer, Fiona Yau	011520.01221	Electrochemical Eradication of Biofilm Related Infections of Passive Orthopedic Implant

Centers of Excellence Report (FY 2016-2017 & FY 2017-2018)

2017-2018	Phosphoserine Containing Compositions for Immune Tolerance Induction	Sathy Balu-Iyer	N/A	Platform delivery technologies based on lipid-based compositions
2017-2018	Plasmonic Phase Modulator	Josep M. Jornet	N/A	Advance THz modulators for faster wireless data transfer
2017-2018	Novel Pneumococcal Vaccine Formulations	Jonathan Lovell, Blaine Pfeiffer	N/A	DProtection against pneumococcal disease without adversely impacting colonization
2017-2018	Electrochemical Eradication of Microbes on Surfaces of Objects		9,616,142	Eradicating biofilms on titanium implants without the use of antimicrobial agents\

Start-up Companies Formed

Reporting Period	Company Name	City	Product/Service
2017-2018	Abcombi Biosciences	Buffalo, NY	Vaccine for Pneumococcal disease
2017-2018	Tactiva Therapeutics	Buffalo, NY	Immuno-oncology company specializing in cancer immunotherapy

Licensing Agreements

Reporting Period	Project	Inventor	Licensing Partner
2016-2017	Enhance the Performance of Bio-Therapeutics by Reducing Immunogenicity	Balu-Iyer/Straubinger	Zoetic Pharmaceuticals
2016-2017	Data for Biologics other than IL-12	Balu-Iyer/Straubinger	Wake Robin Biotechnologies
2016-2017	Wound Healing	Ehrensberger/Campagnari	Garwood Medical Devices
2016-2017	Antigen (Formulated as a Vaccine) Offers Protection Against Pneumococcal Disease	Blaine Pfeifer	Abcombi Biosciences.

Center of Excellence in Material Informatics
University of Buffalo
Dr. Mark Swihart

Importance to NYS

The Center of Excellence in Materials Informatics (CMI) leverages the University at Buffalo's materials science and informatics expertise to drive innovation and critical Research & Development activities that directly impact private sector growth in industries including, but not limited to, advanced manufacturing, life sciences, and energy.

The focus of the CMI is to address materials science challenges through research and innovation by engaging faculty, students, and industry partners, thereby establishing it as a leader in both providing industry solutions and scientific breakthroughs. The Center will advance materials informatics technology through novel research and intellectual property (IP) generation; academic and industrial partnerships in applied research/manufacturing to improve and accelerate the innovation cycle; workforce development; and pursuit and acquisition of federal, state, and private funding.

Impacts

Reporting Period	New Jobs	Retained Jobs	Increased Revenues	Cost Savings	Govt Funds	Non-Govt Funds	Capital Improv's	Total Impacts
2017-2018	47	0	\$1,242,168	\$599,871	\$4,592,344	\$27,569,968	\$873,859	\$34,878,210
2016-2017	32	9	\$4,500	\$196,000	\$425,857	\$27,355,000	\$1,813,743	\$29,795,100

Designations and Recognitions

Not Reported

Operating Budget**2017-2018 Reporting Period**

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	655,434	\$579,102	\$1,234,536
Contracting Services	\$30,000	\$0	\$30,000
Travel	\$16,000	\$0	\$16,000
Equipment	\$95,903	\$76,333	\$172,236
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$98,315	\$0	\$98,315
Other	\$104,348	\$344,565	\$448,913
Total	\$1,000,000	\$1,000,000	\$2,000,000

2017-2018 Total Federal: \$0

2017-2018 Total In-kind: \$0

2016-2017 Reporting Period

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$702,028	\$579,102	\$1,281,130
Contracting Services	\$0	\$0	\$0
Travel	\$16,000	\$0	\$16,000
Equipment	\$68,476	\$76,333	\$144,809

Centers of Excellence Report (FY 2016-2017 & FY 2017-2018)

Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$105,304	\$344,565	\$449,869
Other	\$108,192	\$0	\$108,192
Total	\$1,000,000	\$1,000,000	\$2,000,000

2016-2017 Total Federal: \$0

2016-2017 Total In-kind: \$0

Capital Expenditures

Capital Equipment Purchases	NYSTAR Funding	Federal	Other Sources	In-kind	Total
Universal Measurement Spectrophotometer	\$39,064	\$0	\$48,936	\$0	\$88,000

Commercialization Capabilities and Competencies

UB's New York State Center of Excellence in Materials Informatics (CMI) leverages the University's cutting-edge materials science, big data analytics, and advanced manufacturing expertise and infrastructure to drive critical R&D activities that directly impact private sector growth.

Together with UB's Center for Advanced Technology (UB CAT) and the New York State Center of Excellence in Bioinformatics & Life Sciences (CBLS), the CMI anchors UB's technology-based economic development (T-BED) infrastructure. These centers provide the platform whereby the University engages with New York State to develop and implement priority projects like the Buffalo Billion Investment Development Plan's Buffalo Manufacturing Works (\$40M over five years), Start-Up NY, and other largescale, public-private partnerships. The three NYSTAR-supported Centers bring critical and unique assets to the region in terms of both technologies and teams with scientific, business development, economic development, finance, and legal expertise.

The CMI works with over 80 materials research faculty with extensive funding from federal agencies and private industry with expertise in domains such as: advanced nanomaterials; additive manufacturing; ceramics; clean energy technologies; coatings for optical, medical, and industrial applications; gas processing; optics, photonics, lasers; and many other areas.

New Products or Processes

Reporting Period	Patent Name	Inventor	Patent Number	Description
2016-2017	Accelerating Orthodontic Treatment Using Mechanical Vibrations	Amin Karami, Muath Ahmad Bani Hani, Sawsan Tabbaa	N/A	Vibration therapy in a compact intra-oral device
2016-2017	Novel Pneumococcal Vaccine Formulations	Jonathan Lovell, Blaine Pfeifer, Charles H. Jones	N/A	Antigen that offers broad protection against pneumococcal disease
2016-2017	Anti-Ferromagnetic Magneto-Electric Spin-Orbit Read Logic	Jonathan Bird, Dmitri Nikonov Christian Binek, Xia Hong, Peter Dowben, Kang Wang	N/A	Can manipulate magnetically ordered states by electrical means and incorporate voltage-controlled nonvolatile magnetic state variables into a scalable memory device
2016-2017	Composite Nanoparticles	Michael Detty	N/A	Such nanostructures are useful for surface-enhanced Raman spectroscopic

Centers of Excellence Report (FY 2016-2017 & FY 2017-2018)

2016-2017	Electrochemical Eradication of Microbes on Surfaces of Objects	Mark Ehrensberger, Anthony A Campagnari, Esther Takeuchi, Nicole Luke- Marshall, Jeremy Gilbert	9616142	Potentiometer controlled three-electrode system capable of quickly and reliably eradicating biofilms on titanium implants without the use of antimicrobial agents
2017-2018	Magneto-Electric Logic Devices Using Semiconductor Channel With Large Spin Orbit Coupling	Jonathan Bird, Dmitri Nikonov Christian Binek, Xia Hong, Peter Dowben, Kang Wang	15/898,457	Anti-Ferromagnetic Magneto-electric Spin-Orbit Read Logic
2017-2018	Optically Transparent and Colorless 3D Printable Resin	Chong Cheng, Chi Zhou, Javid Rzayev	62/612,361	Biocompatible, Optically Transparent and Colorless DLP-3D Printable Resin
2017-2018	Mixed Transition Metal Oxides Silica Xerogels	Michael Detty, Corey Damon, Caitlyn Gatley		Mixed Transition Metal Oxide Silica Xerogels as Antifouling/Fouling Release Surfaces
2017-2018	Systems for Passive Cooling	Qiaoqiang Gan, Haomin Song, Zongfu Yu, Ming Zhou	62/652,886	Accelerate water condensation with radiative passive cooling
2017-2018	Piezoelectric Energy harvesting using a nonlinear buckled beam	M. Amin Karami, Mohammad Hossein Ansari	PCT/US2017/47872	Energy harvesting from thermally buckled piezoelectric beams
2017-2018	Energy Harvesting from Constrained Buckling of Piezoelectric Beams	M. Amin Karami, Mohammad Hossein Ansari, Daniel Inman	168359867	Multi-beam shoe energy harvester with an embedded stop mechanism
2017-2018	Device and Method for Accelerating Orthodontic Treatment	M. Amin Karami, Mohammad Hossein Ansari, Sawsan Tabbaa	PCT/US2018/23899	Accelerating orthodontic treatment using mechanical Vibrations through PVDF actuators
2017-2018	Ultrahigh Molecular Weight Block Copolymers	Haiqing Lin, Javid Rzayev, Jose Kenneth Mapas	PCT/US2018/31215	Filtration membranes comprising high molecular weight polyketal containing block copolymers
2017-2018	Orbital Angular Momentum Microlaser	Natalia Litchinitser, Liang Feng	15/920,371	Orbital Angular Momentum Microlaser
2017-2018	Serum-Stable Compositions for Light-Triggered Release of Materials	Jonathan Lovell, Dandan Luo, Kevin Carter, Shuai Shao, Jumin Geng	15/563,703	Serum-Stable PoP-liposomes that Release Contents Upon Exposure to Red Light.

Start-up Companies Formed

Reporting Period	Company Name	City	Product/Service
2016-2017	NanoHydroChem, LLC	Buffalo	Nanomaterials for hydrogen generation.
2017-2018	POP Biotechnologies, LLC	Buffalo	Platform Technology solutions in Oncology and Infectious Disease

Centers of Excellence Report (FY 2016-2017 & FY 2017-2018)

2017-2018	ProOsseous, LLC	Buffalo	Synthetic bone regeneration materials based on nano-calcium sulfate (nCS) material developed at UB and licensed to ProOsseus.
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Licensing Agreements

Reporting Period	Project	Inventor	Licensing Partner
2016-2017	Marine Coating Products	Bright and Detty	MIRAPAKON™ Inc.
2017-2018	Platform Technologies in Oncology and Infectious Disease	Jonathan Lovell	POP Biotechnologies, LLC
2017-2018	Synthesis and Modification Methods and Application in Bone Regenerative Therapy	Robert Genco, Mark Swihart, Young Bum Park, Rosemary Dziak, H. Perinpanayagam	ProOsseous, LLC

Center of Excellence in Data Science
University of Rochester
Dr. Scott Steele / Dr. Walter Johnson

Importance to NYS

The Rochester Center of Excellence in Data Science brings leading, highly talented researchers, engineers, and computer scientists together with the necessary resources to empower collaborations in data science across diverse fields, initially focusing on Predictive Health Analytics, Cognitive Systems, and Analytics on Demand. The center builds upon existing University collaborations with companies such as Xerox and IBM to create the nation's most advanced high-performance computing health research center.

The focus of the Center is to support research, education and business development partnerships, which ultimately enhance regional economic development. This includes: increasing competitively awarded research grants and generating innovative technologies/methods; driving growth of large and small commercial partners; increasing the pool of well-trained, highly skilled data scientists to meet national demands; and increasing access to advanced computing facilities and expertise.

Impacts

Reporting Period	New Jobs	Retained Jobs	Increased Revenues	Cost Savings	Govt Funds	Non-Govt Funds	Capital Improv's	Total Impacts
2017-2018	0	0	\$0	\$100,000	\$0	\$200,000	\$41,021	\$341,021
2016-2017***	0	0	\$0	\$0	\$0	\$0	\$0	\$0

***University of Rochester was designated in 15-16 fiscal year but did not execute original contract until 3/25/16. They were still ramping up center operations in the 2016-17 year.

Designations and Recognitions

Not Reported

Operating Budget**2017-2018 Reporting Period**

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$781,926	\$855,000	\$1,636,926
Contracting Services	\$0	\$0	\$0
Travel	\$5,500	\$0	\$5,500
Equipment	\$75,000	\$0	\$75,000
Space/Property & Utilities	\$0	\$0	\$0
Operating Expenses	\$117,289	\$128,250	\$245,539
Other	\$20,285	\$16,750	\$37,035
Total	\$1,000,000	\$1,000,000	\$2,000,000

2017-2018 Total Federal: \$0

2017-2018 Total In-kind: \$0

2016-2017 Reporting Period

Expense Category	NYSTAR Funding	Match	Total Expenses
Salaries & Fringe	\$772,007	\$840,635	\$1,612,642
Contracting Services	\$0	\$0	\$0
Travel	\$15,000	\$0	\$15,000
Equipment	\$55,821	\$0	\$55,821
Space/Property & Utilities	\$0	\$0	\$0

Centers of Excellence Report (FY 2016-2017 & FY 2017-2018)

Operating Expenses	\$115,801	\$126,095	\$241,896
Other	\$41,371	\$33,270	\$74,641
Total	\$1,000,000	\$1,000,000	\$2,000,000

2016-2017 Total Federal: \$0

2016-2017 Total In-kind: \$0

Capital expenditures (include Federal State, local funds & in-kind)

Capital Equipment Purchases	NYSTAR Funding	Federal	Other Sources	In-kind	Total
Research Computing Equipment	\$34,932	\$0	\$0	\$0	\$34,932
Dell Poweredge C4140	\$52,889	\$0	\$0	\$0	\$52,889
Tarmin Gridbank Appliance Node	\$22,075	\$0	\$0	\$0	\$22,075

Commercialization Capabilities and Competencies

The Rochester Center of Excellence in Data Science (CoE) leverages and further supports the data science expertise at the University of Rochester’s Goergen Institute for Data Science (GIDS), with faculty across disciplines of computer science, medicine, brain and cognitive sciences, biomedical engineering, optics, electrical and computer engineering, chemistry, business, biology and other fields.

The CoE is focused on developing and expanding industry partnerships by applying data science in three primary domains:

1. Health Analytics
2. Artificial Intelligence & Cognitive Science
3. Cyber-physical Systems

New Products or Processes

Reporting Period	Patent Name	Inventor & Co-Inventors	Invention ID
2016-2017	Computer Vision Based Method and System for Evaluating and Grading Surgical	Jiebo Luo, Yousuf Mohamed Khalifa, Junhuan Zhu	9,424,656

Start-up Companies Formed

Not Reported

Licensing Agreements

Not Reported