

SPARKING ECONOMIC GROWTH 2.0

Companies Created from
Federally Funded University
Research, Fueling American
Innovation and Economic Growth

October 2013



ABOUT THIS REPORT

This report was prepared by The Science Coalition to illustrate one way in which federal investment in basic scientific research helps to stimulate the economy. Sparking Economic Growth 2.0 is a companion report to *Sparking Economic Growth: How federally funded university research creates innovation, new companies and jobs*, released in 2010.

Sparking Economic Growth 2.0 highlights a new set of 100 companies that trace their roots to federally funded university research. These companies were self-selected by the member universities of The Science Coalition and are illustrative of the many companies that are the result of federally funded university based research.

Response to the first Sparking Economic Growth report was significant and it has been widely cited to illustrate some of the paybacks on federal funding for basic scientific research. One question often asked about that report was: What was the amount of federal funding behind each company? In version 2.0 we attempt to answer that question by providing an estimate of the amount of federal funding that helped support the initial research conducted at the university that contributed to the discovery or core technology behind each company.¹

The Science Coalition is a nonprofit, nonpartisan organization of more than 50 of the nation's leading public and private research universities. It is dedicated to sustaining the federal government's investment in basic scientific research as a means to stimulate the economy, spur innovation and drive America's global competitiveness. Learn more about The Science Coalition at www.sciencecoalition.org.

¹ Because the foundational research behind a company was often conducted over a long period of time, a long time ago, and/or as a piece of a much larger research effort, the funding amounts are estimates and are available for most but not all companies.

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Individual write-ups on each of the 100 companies in Sparking Economic Growth 2.0 as well as a searchable/sortable database of all companies in both this and the 2010 report are available at www.sciencecoalition.org/successstories.



“Innovation is a cornerstone of American progress, improving our lives in countless ways and providing jobs and economic growth. For decades, innovation has been fueled by federally funded research that is conducted at universities across our nation. America’s future economic prosperity depends on increased investments in research and education that will accelerate innovation and inspire future generations of scientists.”

Rebecca Blank

Chancellor, University of Wisconsin-Madison
Former Acting Secretary, U.S. Department of Commerce

SPARKING ECONOMIC GROWTH 2.0

Sparking Economic Growth 2.0 illustrates one of the many ways federal funding for scientific research produces returns: the creation of new companies. As this report shows, these companies are contributing to the economy in significant ways. They are bringing to market transformative innovations in energy, medicine, defense and technology; creating new jobs and boosting local economies; and succeeding at rates greater than most new businesses in the United States.

The 100 companies featured here can be traced back to research conducted at a university and sponsored by a federal agency. Were it not for the federally supported research conducted over years — and in many cases, decades — these companies, their products and services and the jobs and economic growth that have resulted, likely would not exist today. The total investment in the fundamental research that gave root to these companies was approximately \$330 million, a small sum considering all that has been gained as a result of that research.

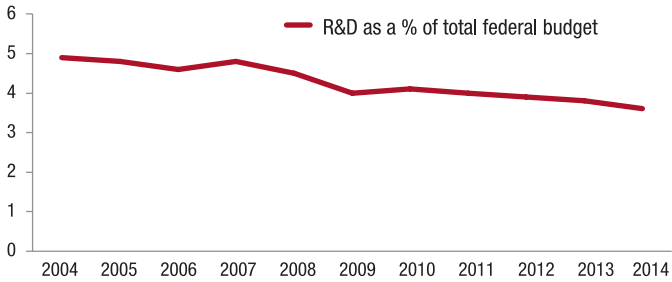
AN INVESTMENT WITH TREMENDOUS RETURN

There is no question that when the federal government invests in scientific research there is a tremendous return. Knowledge is gained; discoveries are made with profound implications for our health, safety and quality of life; future scientists, doctors, teachers and leaders are educated; innovations give birth to new technologies, companies and industries; and jobs are created. All of this activity advances our economy and global competitiveness. Yet federal funding for research and development has been on a downward trend for the past decade and has not exceeded 5 percent of the federal budget since 1990.² Funding for R&D in FY 2013 accounted for just 3.8 percent of the federal budget, which is a historic low point. Significantly, the budget sequestration assures that research funding will continue to be squeezed for many years to come.

This is a dangerous trend. Research and the transformative discoveries that flow from it require sustained funding over many years to yield results. The innovations fueled by federal research investments since World War II contributed greatly to our economic growth over the last half century. The negative effects of America's disinvestment in science that is occurring as a result of sequestration will be felt for decades to come.

² "R&D as a Percent of the Total Federal Budget, 1962–2014," AAAS R&D Budget and Policy Program, June 2013.

R&D as a Percent of the Total Federal Budget



Source: AAAS

Sequestration

Sequestration refers to the automatic, across-the-board cuts to discretionary spending included as part of the Budget Control Act (BCA) of 2011. Sequestration took effect in March 2013 when Congress and the White House failed to reach agreement on other means to reduce the budget deficit. Without congressional action, sequestration remains in effect through 2021 and will reduce funding for scientific research and development by approximately \$95 billion³ during this time. This reduction, as well as the tight caps on discretionary spending already put in place by the Budget Control Act of 2011, will have a devastating impact on America's research enterprise.

³ "Eroding Our Foundation: Sequestration, R&D, Innovation and U.S. Economic Growth," The Information Technology and Innovation Foundation, September 2012, page 1.



Lita Nelsen

Director
MIT Technology Licensing Office

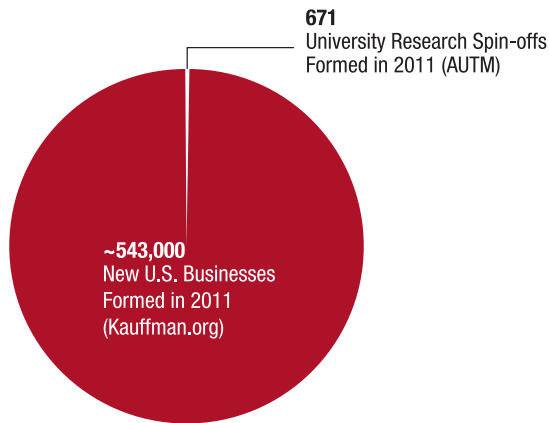
“Startup companies are a critical component in bringing inventions from federally funded basic research into public use. Often university-stage inventions are too early in development to be adopted by established companies; the startups can provide the bridge to commercial adoption. In many industries, larger established companies have become dependent on partnering with startups for new product flow. An average of 20 startups a year take licenses to patents from MIT research; a number have grown to be billion-dollar companies.”

RESEARCH-BASED COMPANIES: AN INNOVATION ENGINE

Each year in the United States several hundred thousand new businesses are formed. Only a tiny fraction of these companies can trace their roots to discoveries from federally funded university research. Yet these research-based companies are contributing to the economy in significant ways and often succeeding while other new companies fail.

These are the companies that are the driving force behind much of the innovation in the United States. Look at rankings such as *MIT Technology Review's* “50 Disruptive Companies” or *R&D Magazine's* “100 Top Innovations” and they are peppered with university research spin-offs. Diagnostics For All, Semprius, Google, Cellular Dynamics International, WiTricity, Akamai, Amyris, iRobot, Pacific Bioscience, Protea Bioscience, Vorbeck Materials, NanoSonic, and Advanced Diamond Technologies — each of these companies got its start as a federally funded research project at a university or national laboratory. For the stories behind these companies and their university research connection, visit www.sciencecoalition.org/successstories.

Research Spin-offs vs. New Businesses



According to a study⁴ by scholars Fred Block and Matthew Keller published by the Information Technology and Innovation Foundation, the source of innovation in the United States has shifted in two key ways over the past four decades. First, large firms acting independently account for a much smaller share of award-winning innovations, while innovations stemming from collaborations with spin-offs from universities and federal laboratories make up a much larger share. Second, the number of innovations that are federally funded has increased dramatically.

⁴ “Where Do Innovations Come From? Transformations in the U.S. National Innovation System, 1970–2006,” Fred Block and Matthew Keller, July 2008, published by the Information Technology and Innovation Foundation.

SUCCEEDING WHEN OTHER COMPANIES FAIL

While only half of all new businesses formed in the United States survive more than five⁵ years, companies grounded in federally funded university research appear to do better.

A look at the companies highlighted in the 2010 version of Sparking Economic Growth illustrates the relative success of research-based startups. Of the 100 companies in that report, 89 remain in business today. More significantly, of the 20 young companies (those that were less than five years old in 2010), 16 remain in business in September 2013, beating the odds of most new businesses.

Young Companies

Company	Founded
Advanced Body Sensing, LLC	2007
Aursos, Inc.	2007
Eden Park Illumination, Inc.	2007
FluGen, Inc.	2007
Sharklet Technologies, Inc.	2007
Spin Transfer Technologies	2007
Cerulean Pharma, Inc.	2006
FAST Diagnostics, Inc.	2006
iCardiac Technologies	2006
ImagiSonix	2006
ImmuneWorks	2006
Solarmer Energy, Inc.	2006
TetraVitae Bioscience	2006
Virtual Incision Corporation	2006
Vorbeck Materials Corporation	2006
Zymetis, Inc. (Acquired)	2006

⁵ "Frequently Asked Questions About Small Business," Small Business Administration, September 2012.

YOUNG COMPANIES

Of the 20 young companies (those less than five years old) highlighted in the 2010 report 16 remain in business in 2013. From novel surface technologies for hospitals based on the microbe-resistant properties of sharkskin to developing a better, more effective flu vaccine, these companies are succeeding in bringing forward innovations developed as a result of federally funded university research.

To learn about these companies, visit www.sciencecoalition.org/successstories.

WHAT MAKES COMPANIES SPUN OFF FROM UNIVERSITY RESEARCH DIFFERENT?



From seemingly arcane basic science to improving PET scans

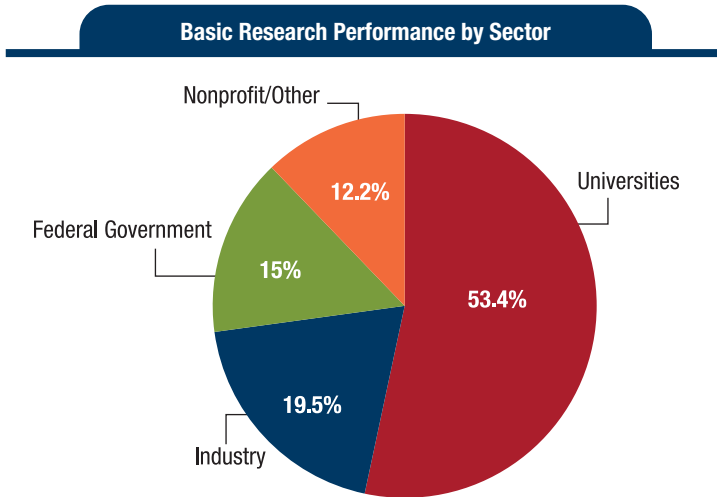
“Our original NSF grant ‘Anhydrous Fluoride Salts’ that formed the basis of Ground Fluor’s technology, focused on the behavior of ions in solution. Although that topic seems very basic and far removed from preparing medical imaging agents, it was only by developing fundamental understanding that we were able to make the fluorinated radiotracer synthesis methodology practical.”

Stephen DiMugno

Professor of Chemistry, University of Nebraska-Lincoln,
Founder, Ground Fluor Pharmaceuticals, Inc.

Universities Are Where Basic Science Happens

Universities today conduct the majority of basic science in the United States, 53 percent.⁶ The majority of that work, approximately 60 percent, is funded by the government. The days of major corporate research laboratories — RCA, Xerox and Bell Labs — that invested in basic science are gone, having given way to a shorter-term focus on applied research and development. Industry today performs only 20 percent of basic research.



Source: National Science Foundation

⁶ National Science Foundation, “Science and Engineering Indicators 2012,” chapter 5.

ba-sic sci-ence

noun

1. Basic Science is curiosity driven. It is conducted to discover new knowledge and help us understand why things happen. Basic science is essential to the performance of applied research and the development of new technologies and commercial products.

Years of Foundational Work

One of the reasons the bulk of basic science in the United States is conducted at universities or national labs is because it takes time, often a long time. Many of the companies highlighted in this report are based on years — even decades — of work. The researchers conducting this work were free to focus on their scientific mission. They were able to explore basic questions about life and the physical world without having to demonstrate commercial value. While commercialization was one outcome, it was not the goal of their research. This simply does not happen today in industry.

Years of Research

Tivorsan Pharmaceuticals	Xerion Advanced Battery Corp.
Twenty-four years of basic science by Dr. Justin Fallon at Brown University led to the discovery of biglycan, which is being developed by Tivorsan to treat serious neuromuscular disorders, including Duchenne muscular dystrophy and Becker muscular dystrophy.	Almost a decade of work by a team of researchers at the University of Illinois at Urbana-Champaign led to its core innovation — nanotechnology with the potential to dramatically reduce charge times for electric car and cell phone batteries.
Melanovus Oncology	Trak Surgical
Melanovus Oncology is developing new therapies and diagnostics for late stage melanoma and other skin cancers following almost 12 years of research at the Pennsylvania State University.	Trak Surgical is developing a first-of-a-kind computer-assisted system for joint replacement surgery following 12 years of research and development at the University of Nebraska Medical Center.



From NSF research project to a new industry

“Federally supported research, particularly for computer science through the National Science Foundation, continues to play a key role in the technology industries. Eucalyptus, which began as an NSF-funded research project at University of California, Santa Barbara, would never have launched the private cloud industry without the federal investment in computer science research that made it possible.”

Dr. Rich Wolski
Co-founder and Board Member
Eucalyptus Systems

Transformational Innovations

Another significant distinction between university research startups and many other new businesses is that these companies are bringing forward potentially transformational innovations — new ways of doing things and solutions to problems that are ahead of the curve and have potentially significant societal and economic impact.

In 1995, Tim Berners-Lee, inventor of the World Wide Web, foresaw the problem that congestion would cause Internet users and challenged his MIT colleagues to invent a better way to deliver Internet content. MIT colleague Tom Leighton, an expert on parallel algorithms and architecture, took up the challenge, recognizing that a solution to web congestion could be found in applied mathematics and algorithms. With the help of graduate student Danny Lewin and several other top researchers and support from the **Department of Defense** and the **National Science Foundation**, he tackled the problem. The result, a novel coding called consistent hashing, would evolve into the core of **Akamai’s** technology. Today, Akamai is improving your Web experience. The company has more than 3,000 employees and delivers between 15 – 30 percent of all Web traffic.

HaloSource, an 80-person company based in Washington State, is enabling access to clean water around the world. The company is based on the discoveries of an **Auburn University** professor who, in the early 1990s, was concerned about the lack of access to clean water in many parts of the world and whose research on polymeric water disinfection and detoxification supported by the **Department of Defense** and **Department of Agriculture** led to a water purification technology that could easily and inexpensively be incorporated into disinfecting cartridges. Today, HaloSource develops technologies to disinfect and purify the water people drink, play in, clean with and put back into water systems.

Amyris is a renewable products company providing plant-based alternatives to a broad range of petroleum-sourced products, including diesel and jet fuels. The company is a 2003 spin-off of the **University of California, Berkeley** with nearly 400 employees. Research conducted at UC Berkeley and supported by the **Department of Defense** and **National Science Foundation** led to a process to turn plant-sourced sugars into renewable hydrocarbons. The company's first product was a plant sugar-derived alternative anti-malarial drug, which is being made available at low-cost in economically disadvantaged countries around the world.



Putting advanced materials and electronics to work for our warfighters

“The role of federally funded university research cannot be overstated. We have leveraged our federally funded programs to develop game-changing Department of Defense-centric technologies that have in some cases led to the spinning out of small businesses such as Metamagnetics Inc. Metamagnetics transitions university innovation to the warfighter — creating much-needed high skill jobs in addition to solving mission critical challenges.”

Vincent Harris

University Distinguished Professor, Department of Electrical and Computer Engineering, Northeastern University
Founder, Metamagnetics Inc.



Dr. Terri Lomax

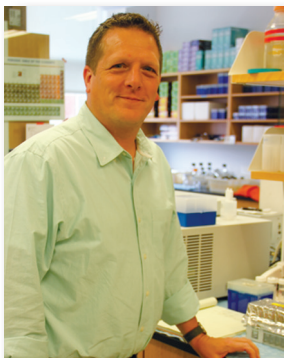
Vice Chancellor
Office of Research, Innovation
& Economic Development
North Carolina State University

“At NC State, we know that creating a comprehensive innovation ecosystem is the best way to leverage the research discoveries of our faculty, students and partners and get them into the marketplace. We have more than 65 companies, non-profit and government sector partners totaling nearly 2,000 employees on the university campus. With help from these and other partners, we have created world-class research tools and infrastructure — including a new library, academic and research buildings and spaces for collaboration and innovation — that bring students, researchers, businesspeople, government agencies and non-profits together, greatly increasing the chances of success. We aggressively partner with local government and non-profit organizations to better integrate the entire region’s innovation resources and to accelerate commercialization. We have worked together to do all of this because we know it is our shared mission to create, foster and nurture the whole ecosystem of innovation, not just pieces of it.”

A Nurturing Ecosystem

These companies also benefit from the university ecosystem, which provides critical expertise, tools, infrastructure and talent, as well as a creative environment that can help young companies thrive.

University technology transfer offices provide critical counsel and assistance in the patenting and licensing process. They also help researchers in other ways, from identifying potential applications of an innovation to making important introductions and business connections.



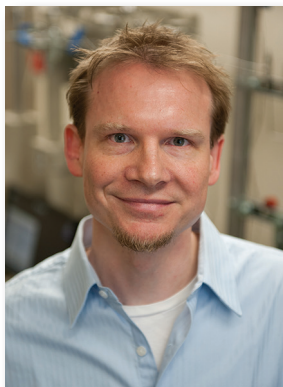
John Cavanagh

The co-founders of **Agile Bioscience**, John Cavanagh and Christian Melander, credit the tech transfer office at **North Carolina State University** with helping them lay a solid foundation for a successful, long-term business enterprise. According to Melander,⁷ “[the tech transfer office] didn’t look at how we could make a quick dime; they looked at how we could really advance the technology and improve the state’s economy.” Agile Bioscience has a technology to disperse biofilms. These colonies of bacteria are highly resistant to antibiotics in the human body and, in the environment, can cause major crop damage.

Business incubators on many campuses provide a supportive environment to help move a company from concept to reality. At the **University of Florida Innovation Hub**, entrepreneurs have access to: accounting, legal and business service providers; laboratory, work and meeting space; the UF technology transfer office; and organizations like the Florida Institute for the Commercialization of Public Research, all of which nurture high-tech companies.

Business schools also provide ready access to the type of expertise and talent that many researcher-entrepreneurs lack. Two of the four companies in the report spun out of the **University of Pennsylvania** — **Graphene Frontiers** and **RightCare Solutions** — are led by MBAs from UPenn’s Wharton School. Graphene Frontiers is leading the way in the large-scale production of high quality graphene. Graphene’s attributes, which include being exceptionally strong, yet flexible; transparent and highly electrically conductive; and less than a nanometer thick, make it ideal for a number of existing and new technologies. RightCare Solutions, an outgrowth of original nursing research led by Dr. Kathryn Bowles at Penn Nursing, helps hospitals reduce their readmission rates — improving patient care and reducing costs — through a proprietary algorithmic discharge decision support system.

⁷ “Agile Sciences: From Idea to Enterprise,” Spring 2013, North Carolina State University *Results* online publication.



Turning carbon emissions into carbon-neutral electricity

“Heat Mining Company stands at the convergence of the practical need to burn fossil fuels to generate the vast majority of the world’s energy needs and the growing concern over emissions of CO₂ as the primary driver of global warming.”

Martin Saar

Professor and Gibson Chair of Hydrogeology and Geofluids
Department of Earth Sciences, University of Minnesota
Founder, Heat Mining Company

The training of students that occurs contributes to the unique nature of the university ecosystem. These are the people who will form the next generation of scientists, engineers, doctors, teachers and entrepreneurs. Federally funded research is especially important to this process as it helps support the labs — and the hiring of post-docs, research assistants, students and others — where this continued education occurs. These “trainees” often become part of the success story.

When researchers at the James Cancer Hospital and Solove Research Institute at **The Ohio State University** were looking for a medium to help them better predict the migratory behavior of malignant tumor cells, it was graduate student Jed Johnson who solved their problem. Johnson, who was studying materials science and engineering, developed a process to create molecule-sized nanofibers capable of producing a more natural, three-dimensional environment to study cancer cells outside the brain and test potential drugs for treating disease. Johnson went on to found **Nanofiber Solutions** with his faculty advisor John Lannutti as an extension of his doctoral research. Johnson’s research was supported by the **National Science Foundation**. Nanofiber Solutions made history in 2011 by designing the synthetic trachea implanted into a human patient — this was only the second-ever successful transplant of its kind.

Discussing two seemingly unrelated research projects, geologic carbon dioxide sequestration and geothermal energy utilization, a **University of Minnesota** earth sciences professor, Martin Saar, and his then Ph.D. student Jimmy Randolph, developed a new concept that resulted in their formation of Heat Mining Company. Based in South Dakota, the company’s technology results in a high-efficiency CO₂-sequestering geothermal power plant with a negative carbon footprint — this means it reduces global warming while generating electricity and heat. Research behind the company was supported in part by the **Department of Energy** and the **National Science Foundation**.

Liquid Light turns industrial waste into usable products. The company grew out of the work of **Princeton University** chemistry professor Andrew Bocarsly and graduate student Emily Cole. It was after the two revived and expanded upon earlier work by Bocarsly’s lab that the technology for their company — to produce industrial chemicals and fuels from carbon dioxide — came to life. The Monmouth Junction, NJ, company has 26 employees. Funding for Bocarsly and Cole’s work was provided in part by the **Department of Energy** and the **National Science Foundation**.

Genomatica CEO Christophe Schilling studied under bioengineer Bernhard Palsson at the **University of California, San Diego**. The two founded Genomatica in 2000 to commercialize their fermentation-based manufacturing processes that allow the economic production of widely-used chemicals from renewable feedstocks. Today, Genomatica is an emerging leader in the global sustainable chemicals market. The research behind the company was supported by the **National Institutes of Health** and the **National Science Foundation**.

LineRate Systems’ core technology, which helps companies scale their network services to support growing Web traffic, grew out of founder John Giacomoni’s doctoral research at the **University of Colorado Boulder** in high-performance networking systems and design. Formed in 2008, LineRate Systems was acquired by F5 Networks in 2013. Funding from the **Department of Defense** helped support some of Giacomoni’s research.



While the impact of research can’t be prejudged, its value is well-proven

“I believe that serendipitous foundational inventions resulting from federally funded projects are a vital link in the engine driving American innovation. The reason is that as with all serendipitous inventions, including the Internet and the technologies driving LineRate Systems, one cannot predict a priori the impact of a federally funded project but the economic impact has been vital.”

John Giacomoni

Co-founder and CTO, LineRate Systems
Doctoral Candidate, Computer Sciences
University of Colorado Boulder



The Honorable Deborah L. Wince-Smith

President & CEO
Council on Competitiveness

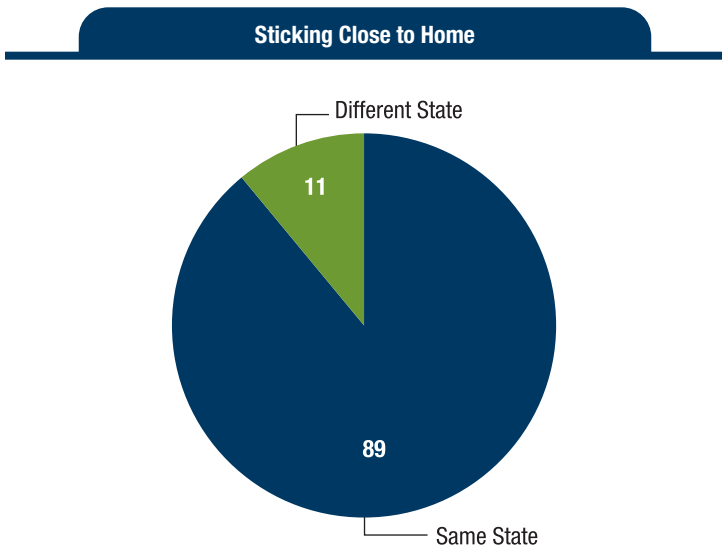
“The foundation of a region’s competitiveness lies in its ability to collaborate and innovate. Healthy regional economies are where new ideas, businesses and jobs are created, often with research universities at its core. The introduction of innovation clusters into U.S. cities and towns promotes partnerships between regional economic initiatives, develops a culture of entrepreneurship, enhances existing resources and revitalizes once shuttered local economies.”

ABOUT THE 100 COMPANIES

Location

Research universities play a vital role in their local economies. They are often the area's largest employer and further contribute to the local economy through their purchase of goods and services. Increasingly, the communities around research universities are becoming high-tech innovation hubs, where the presence of a highly educated labor force and a strong innovation sector attracts more of the same, contributing to a robust local economy. Silicon Valley in California, Research Triangle in North Carolina and Route 128 in Boston are among the best known hubs, but this phenomenon is playing out to differing degrees in university communities across the country.

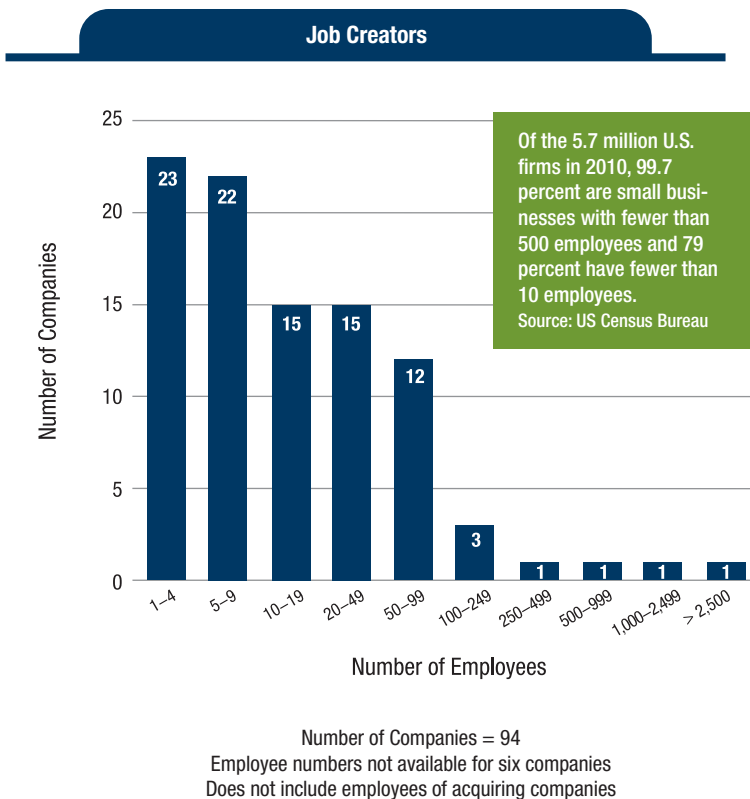
The Sparking Economic Growth 2.0 companies are contributing to this trend. Eighty-nine of 100 companies are headquartered in the same state as the university from which they emanated. And it's not just the newly formed companies that are staying close to their founding university. Of the 30 companies that are 10 or more years old (those formed in 2003 or earlier), all but six are located locally. Of those in other states, at least three are the result of acquisition by out of state companies. The two oldest companies in the report, **Integrated DNA Technologies** and **Myriad Genetics** — spin-offs from the University of Iowa in 1987 and the University of Utah in 1991 respectively — remain headquartered in their home states.



Integrated DNA Technologies (IDT) is a global company that has stuck close to its lowa roots. As a biochemistry professor at the **University of Iowa**, Dr. Joseph Walder was active in the development of anti-sickling compounds and hemoglobin derivative blood substitutes, the cloning of restriction-modification systems, and the development of modified nucleic acids as anti-sense reagents. This work was the foundation of his interest in biotechnological innovation and ultimately what gave birth to IDT, the largest supplier of custom nucleic acids in the United States. The Coralville, IA, company has more than 600 employees worldwide and annual sales approaching \$100M. Dr. Walder's early research and development was supported by the **National Institutes of Health**.

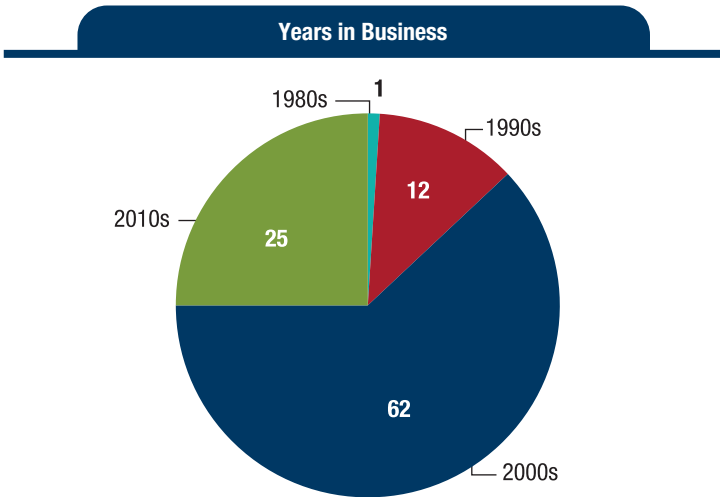
Jobs

The 100 companies in Sparking Economic Growth 2.0 collectively employ over 7,200 people. Similar to the overall U.S. economy, the large bulk of the companies in this report are small businesses with fewer than 500 employees. These are the companies that are creating the majority of new jobs in the United States today. According to the U.S. Small Business Administration, small businesses account for 64 percent of net new private-sector jobs and 49 percent of total private-sector employment.

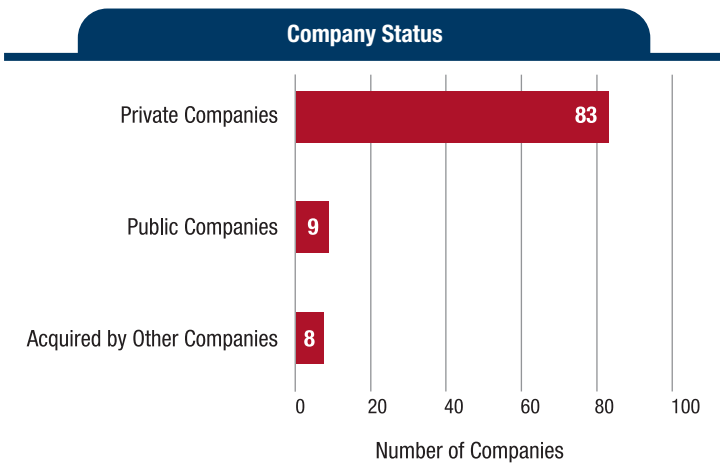


Company Status

The companies span in age from 26 years to just over one year, with the large majority of companies founded in the 2000s. Thirty-four companies were founded in 2009 or later, making them less than five years old. Of the 100 companies, 83 are private, nine are public and eight have been acquired by other companies.

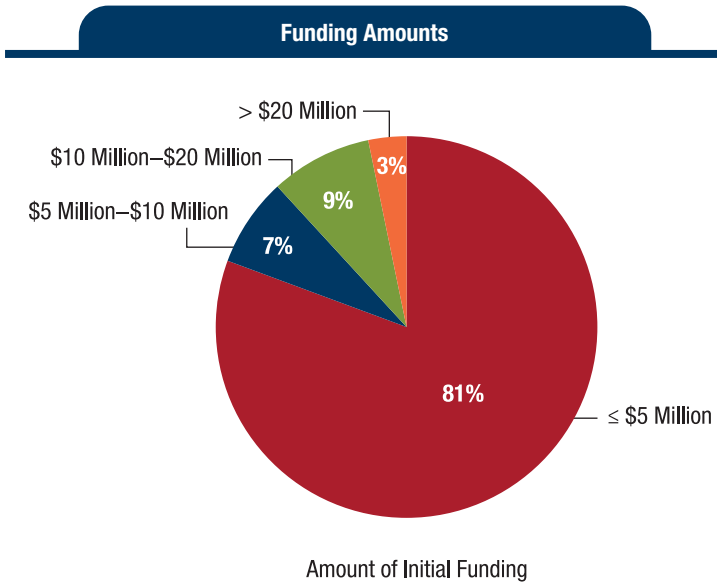


The 100 companies were founded between 1987 and 2012



Research Funding

Approximately \$330 million in federal grants helped support the initial research that was pivotal to the formation of the companies in this report. Funding estimates were provided for 91 companies. Of those, the large majority cited initial funding of \$5 million or less. This funding, competitively awarded over several decades to university researchers, was provided by eight separate federal agencies. In two-thirds of companies, the funding cited was from a single federal agency.



Cancer costs the U.S. economy \$201.5 billion⁸ annually or \$552 million every day.

Cybercrime costs the U.S. economy \$140 billion annually or \$383.6 million⁹ every day.

Alzheimer's disease will cost the nation \$203 billion¹⁰ in 2013. This number is expected to rise to \$1.2 trillion by 2050.

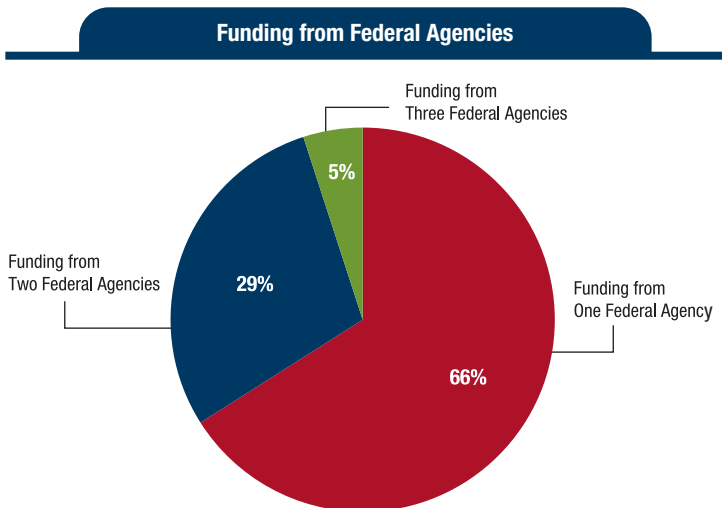
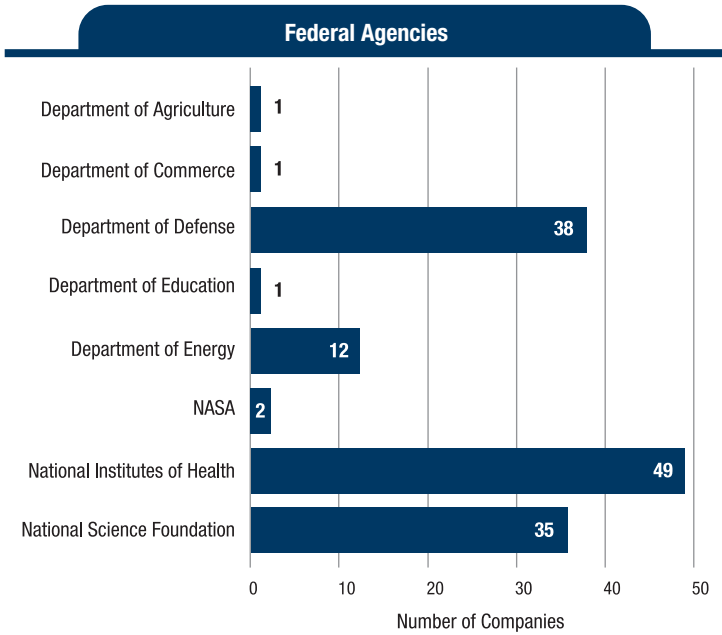
Federally funded researchers are working every day to address these and other problems that have enormous human, economic and societal costs.

⁸ "Economic Impact of Cancer," The American Cancer Society (cancer.org), February 1, 2013.

⁹ "The Economic Impact of Cybercrime and Cyber Espionage," Center for Strategic and International Studies, July 2013.

¹⁰ "Alzheimer's Facts and Figures," Alzheimer's Association (alz.org), 2013.

A further note about federal funding: It's important to point out that, beyond the initial funding of the university based research that is cited in this report, many companies received additional federal research grants. This funding — largely in the form of Small Business Technology Transfer (STTR) and Small Business Innovation Research (SBIR) grants — can be instrumental in helping companies demonstrate their technology and bridge the gap between basic science and commercialization.





Discovering a way to make drugs work better

“While working with the National Cancer Institute [part of the National Institutes of Health] we identified a serious need for a new and safe way to deliver poorly water-soluble anti-cancer drugs that did not further exacerbate the toxicity of the drug itself. With the partial support from NCI, we successfully identified Captisol. To capitalize on our findings we helped create the company, Cydex, a very successful University of Kansas startup.”

Valentino Stella

University Distinguished Professor, Department of Pharmaceutical Chemistry, School of Pharmacy University of Kansas
Founder, CyDex Pharmaceuticals, Inc.

National Labs and Other Government-University Research Collaborations

While extramural research — competitively awarded grants from government agencies to individual investigators — is one of the major ways that academic research is conducted, there are other significant research collaborations between universities and the federal government. The ten national laboratories overseen by the Department of Energy (DOE) Office of Science are one example of this extended collaboration and there are many others as well. Several companies in Sparking Economic Growth 2.0 are spin-offs from these unique collaborations between government agencies and universities that facilitate research in specific fields.

Advanced Diamond Technologies, Inc./Argonne National Laboratory/University of Chicago

Advanced Diamond Technologies is one outcome of a 10-year DOE-funded basic materials science research program at Argonne National Laboratory. ADT has developed a process to turn natural gas into diamond for a variety of industrial, electronic, and medical uses. Argonne is one of ten DOE Office of Science labs affiliated with a major research university. Argonne is managed by UChicago Argonne, LLC. The University of Chicago has served as a prime contractor of Argonne since the lab's founding in 1946.

ColdQuanta/JILA/University of Colorado Boulder

ColdQuanta is the world's first commercial company to sell complete ultra-cold matter systems. The company grew out of decades of research by a University of Colorado professor and his work at JILA, a collaboration of the University of Colorado Boulder and the **National Institute of Standards and Technology** (part of the Department of Commerce). The atom chip technology being developed by ColdQuanta simplifies the production of ultra-cold matter and provides a standardized means for developing practical ultra-cold matter based sensors. Funding from the **Department of Defense** helped support some of the research behind ColdQuanta.

Lyncean Technologies, Inc./SLAC National Accelerator Laboratory/Stanford University

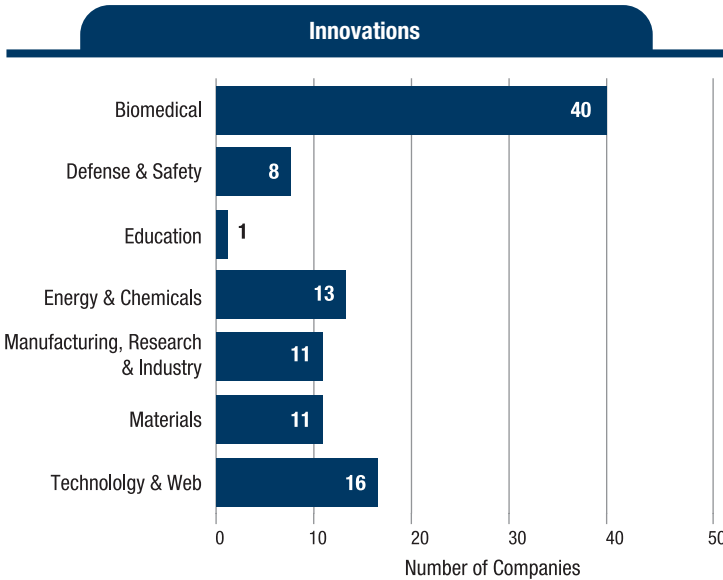
Lyncean is the developer of the Compact Light Source — the world’s smallest colliding-beam storage ring. The miniature synchrotron X-ray source that enables scientists to better see and understand the sub-microscopic details of the physical and biological world is the result of basic research conducted at SLAC National Accelerator Laboratory. SLAC is operated by Stanford University for the DOE Office of Science. The researchers behind Lyncean received support from DOE and the National Institutes of Health.

WatchStander, LLC/Applied Research Laboratory/Pennsylvania State University

As piracy has exploded in the Indian Ocean region, WatchStander was formed in 2011 to apply military technologies developed at the Applied Research Laboratory (ARL) at the Pennsylvania State University to maritime defense more broadly. The U.S. Navy established the ARL at Penn State in 1945 to be a center of excellence in naval science and technologies. The research behind WatchStander was supported by the Department of Defense through the Naval Sea Systems Command.

Innovations

The innovations behind the companies in Sparking Economic Growth 2.0 touch all aspects of society and the economy. Their origins reflect the nature of basic research that is discovery-based, but is also often serendipitous, unexpected or even unusual.



WiTricity's wireless electricity technology results from the quest of company founder and MIT professor Marin Soljagic to find a way for his cell phone to charge itself wirelessly. He was tired of being awakened by his phone's low-battery chirping and determined to develop the physical theory of how to enable strongly coupled magnetic resonators to transfer power over distances that would enable the type of wireless device charging he envisioned. The work of Soljagic and his team was supported by the **Department of Defense**, the **Department of Energy** and the **National Science Foundation**. **WiTricity**, based in Watertown, MA, has 50 employees.

It may have been serendipitous that a musician suffering from tinnitus, a debilitating condition characterized by a ringing in the ear and inability to hear external sounds, ended up in the office of **University of California, Irvine** bioengineer Dr. Gang Zeng. While Zeng, a cochlear implant specialist, didn't have any experience in tinnitus at the time, he nevertheless took up the musician's cause and his ensuing research led to a novel acoustic therapy for the treatment and suppression of tinnitus and the creation of **SoundCure**. Zeng's work was supported in part by \$2 million in research funding from the **National Institutes of Health**. **SoundCure**, based in San Jose, CA, has 30 employees.

The work of **Harvard University** chemistry professor George Whitesides and his research team to study mammalian and bacterial cell mobility and the electrophysiology of ion channels led to a seemingly unexpected outcome – the creation of a not-for-profit organization that works to improve healthcare in the developing world. Cambridge, Massachusetts-based **Diagnostics For All** creates low-cost, easy-to-use, point-of-care diagnostic tools based on a process for putting patterned channels and wells onto a postage stamp-sized piece of paper with biological and chemical assay reagents that react and change color when body fluids are applied. Whitesides' work that led to this process was supported in part by the **National Institutes of Health**. Diagnostics For All has 18 employees.

The study of venom might sound like unusual origins for a biotech startup, but that's how **Tonus Therapeutics** got started. The company, originally called Rose Pharmaceuticals for its link to the Chilean Rose Tarantula, is developing drugs to treat diseases involving biomechanics, with an immediate focus on muscular dystrophy. Dr. Frederick Sachs and his colleagues at the **State University of New York at Buffalo** were studying the effects of venom on mechanosensitive ion channels when they discovered a peptide in the venom of the Chilean Rose Tarantula with the potential to treat muscular dystrophy. This peptide, now made by chemical synthesis is non-toxic, stable, has a long lifetime in animals and has been classified by the U.S. Food and Drug Administration as an orphan drug for its potential to treat an uncommon disease.



Federally funded research fueling American innovation

“Federally supported university research is the seed for technological innovation in America. It enabled the fundamental development of technology that led to the founding of Aurrion, along with many other companies in the area of semiconductors.”

Alexander W. Fang

Co-founder and Chief Executive Officer
Aurrion

STRONG AND STEADY INVESTMENT REQUIRED

This report shows the remarkable creativity, economic impact and results that come out of America's research universities. The 100 companies highlighted here are but a subset of the countless benefits gained when the nation invests in basic scientific research. Indeed, the partnership forged decades ago between the U.S. government and U.S. universities to conduct research on behalf of the American people has enabled the United States to lead the world in scientific discovery and innovation and has contributed greatly to our economic growth. Yet, this formula for success is in jeopardy.

While there is no way to predict which piece of research will yield a discovery with enormous import for our health, safety, environment, economy or quality of life, it is almost certain that the loss of innovation that results from the depressed science funding of the past decade and the ongoing forced cuts under sequestration will be immeasurable and impossible to recoup. The 100 companies in this report are proof of that. Without the sustained federal funding for basic scientific research that occurred years, and in many cases, decades ago, none of these companies would exist today.

If America wants to maintain its innovative edge, create meaningful jobs and realize economic growth, then investment in scientific research must be prioritized.

SPARKING ECONOMIC GROWTH 2.0

Companies Created from
Federally Funded University
Research, Fueling American
Innovation and Economic Growth

COMPANY	LOCATION	FOUNDED	UNIVERSITY	EMPLOYEES	STATUS	TECHNOLOGY	FUNDING AGENCY	AMOUNT
Aculon, Inc.	San Diego, CA	2003	Princeton University	15	Private	Nanotechnology based surface and interfacial coatings	National Science Foundation	\$800,000
Advaita Corporation	Plymouth, MI	2005	Wayne State University	6	Private	Bioinformatics software tools	National Science Foundation	\$1.2M
Advanced Diamond Technologies (ADT), Inc.	Romeoville, IL	2003	University of Chicago	20	Public	Diamond films for electronic, mechanical, industrial and biomedical uses	Department of Energy	\$8M
Agile Sciences, Inc.	Raleigh, NC	2007	North Carolina State University	5	Private	Novel organic compounds that disperse biofilms	National Institutes of Health; National Science Foundation	\$4M
Akamai Technologies, Inc.	Cambridge, MA	1999	Massachusetts Institute of Technology	3,000	Public	Highly-distributed cloud optimization platform for web traffic control	Department of Defense; National Science Foundation	N/A
Akrisis Technologies	Boston, MA	2009	Northeastern University	4	Private	Diagnostic and delivery platform for cancer treatments	National Institutes of Health	\$233,000
Allegro Diagnostics	Maynard, MA	2008	Boston University	6	Private	Molecular diagnostic tests for lung cancer	National Institutes of Health	\$300,000
American BioOptics	Evanston, IL	2006	Northwestern University	5	Private	Reflected light technology for cancer screening and detection	National Institutes of Health	\$2M
Amnyris, Inc.	Emeryville, CA	2003	University of California, Berkeley	397	Public	Process for converting plant sugars into renewable hydrocarbons	Department of Defense; National Science Foundation	\$360,000
AptaMatrix	Syracuse, NY	2003	Syracuse University	5	Private	Diagnostic tools for detection of chemical and biological targets	National Institutes of Health	\$991,000

COMPANY	LOCATION	FOUNDED	UNIVERSITY	EMPLOYEES	STATUS	TECHNOLOGY	FUNDING AGENCY	AMOUNT
Aurion	Santa Barbara, CA	2007	University of California, Santa Barbara	20	Private	Hybrid silicon-photon integration platform	Department of Defense	\$5.1M
Autonomic Materials, Inc.	Champaign, IL	2005	University of Illinois at Urbana-Champaign	8	Private	Self-healing coatings	Department of Defense; National Science Foundation	\$1.06M
Axogen	Alachua, FL	2002	University of Florida	50	Private	Technologies for peripheral nerve regeneration and reconstruction	National Institutes of Health	\$1.5M
Axonon Medical, Inc.	Kalamazoo, MI	2009	University of Pennsylvania	2	Private	Tissue-engineered nerve grafts	Department of Defense; National Institutes of Health	\$2.6M
Cell Biologics	Chicago, IL	2011	University of Illinois at Chicago	2	Private	Genetically modified and mouse primary cell types for research	National Institutes of Health	\$2.6M
Cell Habitats	Woodridge, IL	2005	University of Illinois at Chicago	5	Private	Microd structures for tissue regeneration	National Institutes of Health	\$6.4M
Cellular Dynamics International (CDI), Inc.	Madison, WI	2004	University of Wisconsin-Madison	90	Private	Stem cell technologies for in vitro drug development	National Institutes of Health	N/A
Clearside Biomedical, Inc.	Alpharetta, GA	2011	Emory University	18	Private	Microinjection technology for drug delivery to the eye	National Institutes of Health	\$1.6M
ColdQuanta, Inc.	Boulder, CO	2007	University of Colorado Boulder	18	Private	Cold and ultracold matter components, instruments, and systems	Department of Defense	\$17M
CollabWorx	Syracuse, NY	2000	Syracuse University	8	Private	Secure real-time collaboration and conferencing over internet protocol (CoIP)	Department of Defense	\$3M

COMPANY	LOCATION	FOUNDED	UNIVERSITY	EMPLOYEES	STATUS	TECHNOLOGY	FUNDING AGENCY	AMOUNT
Crystal IS, Inc.	Cohoes, NY	1997	Rensselaer Polytechnic Institute	35	Acquired	High-performance UVC LEDs	Department of Defense	\$7M
Cureveda LLC	Baltimore, MD	2010	Johns Hopkins University	2	Private	Respiratory disease treatments that work by improving cellular defense pathways	National Institutes of Health	\$2M
CyDex Pharmaceuticals, Inc.	La Jolla, CA	1983	University of Kansas	N/A	Acquired	Drug formulation technology	National Institutes of Health	\$40,000
CytoVas, LLC	Philadelphia, PA	2010	University of Pennsylvania	3	Private	Simple blood test provides comprehensive profile of vascular health	Department of Defense; National Institutes of Health	\$3M
Diagnostics for All (DFA)	Cambridge, MA	2007	Harvard University	18	Private	Patterned paper technology diagnostic devices for use in developing countries	National Institutes of Health	\$310,000
Dysonics Corporation	San Francisco, CA	2011	University of California, Davis	9	Private	Audio technologies	National Science Foundation	\$1.3M
EPIR Technologies	Bolingbrook, IL	1998	University of Illinois at Chicago	60	Private	Optoelectronic materials and sensors for infrared and photovolatile technologies	Department of Defense; Department of Energy; National Science Foundation	\$13.5M
ET International, Inc.	Newark, DE	2000	University of Delaware	21	Private	Multi-core programming technology	Department of Defense; Department of Energy	\$220,019
Eucalyptus Systems	Goleta, CA	2009	University of California, Santa Barbara	60	Private	Public and private cloud computing systems	National Science Foundation	\$769,555
Food Chain Safety	Maple Valley, WA	2010	Washington State University	4	Private	FDA-approved, microwave-based food sterilization process	Department of Defense	\$2.5M

COMPANY	LOCATION	FOUNDED	UNIVERSITY	EMPLOYEES	STATUS	TECHNOLOGY	FUNDING AGENCY	AMOUNT
Framegy™	College Station, TX	2011	Texas A&M University	2	Private	Metal organic framework materials for clean energy and other applications	Department of Energy; National Science Foundation	\$1.5M
Galaxy Diagnostics, Inc.	Research Triangle Park, NC	2007	North Carolina State University	6	Private	Diagnostic test for Bartonella species bacteria	National Institutes of Health	\$165,000
General Sentiment	Jericho, NY	2008	Stony Brook University	14	Private	Social analytics	National Science Foundation	\$800,000
Genoece Biosciences	Cambridge, MA	2006	Harvard University	50	Private	Technology replicates immune system's response to bacteria and viruses for vaccine development	National Institutes of Health	\$205,000
Genomatix, Inc.	San Diego, CA	2000	University of California, San Diego	70	Private	Fermentation-based process for sustainable chemical production	National Institutes of Health; National Science Foundation	\$2.2M
Glycofi	Lebanon, NH	2000	Dartmouth College	N/A	Acquired	Engineered yeast strains for therapeutic protein production	National Institutes of Health	\$1M
Graphene Frontiers	Philadelphia, PA	2010	University of Pennsylvania	4	Private	Technology for large-scale production of graphene	Department of Defense; National Science Foundation	\$700,000
Ground Fluor Pharmaceuticals, Inc.	Lincoln, NE	2012	University of Nebraska	2	Private	Imaging agents for diagnosis and disease management	National Science Foundation	\$420,000
HaloSource, Inc.	Bothell, WA	1998	Auburn University	80	Public	Water disinfection technology	Department of Agriculture; Department of Defense	\$250,376
Heat Mining Company, LLC	Rapid City, SD	2012	University of Minnesota	10	Private	Carbon dioxide plume geothermal technology produces energy and reduces CO2 emissions	Department of Energy; National Science Foundation	\$4.3M

COMPANY	LOCATION	FOUNDED	UNIVERSITY	EMPLOYEES	STATUS	TECHNOLOGY	FUNDING AGENCY	AMOUNT
Hiperwall Inc.	Irvine, CA	2008	University of California, Irvine	5	Private	Video wall display software technology	National Science Foundation	\$393,533
Holomic, LLC	Los Angeles, CA	2011	University of California, Los Angeles	8	Private	Technology turns cell phones into portable microscopes and medical devices	Department of Defense; NASA; National Institutes of Health	N/A
Hummingbird Nano Inc.	Lexington, KY	2012	University of Kentucky	3	Private	Technology enables manufacture of precision micro- and nano-scale parts	Department of Education; National Science Foundation	\$300,000
ImagineOptix	Raleigh, NC	2004	North Carolina State University	3	Private	Optical thin-films enable miniature video projectors for consumer electronics	National Science Foundation	\$100,000
Immersive Touch	Westmont, IL	2005	University of Illinois at Chicago	12	Private	Simulation-based surgical training and exploration tools	Department of Commerce; National Institutes of Health	\$500,000
ImmuNext	Lebanon, NH	2010	Dartmouth College	5	Private	Immune-based protein therapeutics for cancer and autoimmune diseases	National Institutes of Health	\$425,000
Infinity Pharmaceuticals	Cambridge, MA	2001	Harvard University	176	Public	Cell-permeable small molecule oncology drugs	National Institutes of Health	\$2M
Inhibikase Therapeutics, Inc.	Atlanta, GA	2010	Emory University	2	Private	Antiviral therapies to treat polyoma virus-based diseases	National Institutes of Health	\$2.1M
Integrated DNA Technologies (IDT), Inc.	Coraville, IA	1987	University of Iowa	650	Public	Synthetic DNA/RNA for research	National Institutes of Health	\$5.7M
KAI Pharmaceuticals	San Francisco, CA	2012	Stanford University	N/A	Acquired	Peptide therapy for kidney dialysis patients	National Institutes of Health	\$35M

COMPANY	LOCATION	FOUNDED	UNIVERSITY	EMPLOYEES	STATUS	TECHNOLOGY	FUNDING AGENCY	AMOUNT
Kolltan Pharmaceuticals, Inc.	New Haven, CT	2007	Yale University	30	Private	Cancer therapeutics	National Institutes of Health	\$1M
Koning Corporation	Rochester, NY	2002	University of Rochester	9	Private	Advanced medical imaging systems that produce 3D volumetric images	Department of Defense; National Institutes of Health	\$679,597
LineRate Systems, Inc.	Louisville, CO	2008	University of Colorado Boulder	20	Acquired	Web traffic optimization	Department of Defense	\$100,000
Liquid Light	Monmouth Junction, NJ	2009	Princeton University	26	Private	Technology turns carbon dioxide into industrial chemicals and fuels	Department of Defense; Department of Energy; National Science Foundation	\$2M
Lycera Corp	Ann Arbor, MI	2006	University of Michigan	25	Private	Oral medicines for autoimmune diseases	National Institutes of Health	\$3M
Lyncean Technologies, Inc.	Palo Alto, CA	2002	Stanford University	20	Private	Compact Light Source technology	Department of Energy; National Institutes of Health	N/A
MacuCLEAR, Inc.	Plano, TX	2006	Texas A&M University	2	Private	Topical treatment for dry age-related macular degeneration	National Institutes of Health	\$1M
Melanovus Oncology	Hummelstown, PA	2012	Pennsylvania State University	5	Private	Diagnostics and treatments for late stage melanoma and other skin cancers	National Institutes of Health	\$3.3M
MesoScribe Technologies Inc.	St. James, NY	2002	Stony Brook University	17	Private	Harsh environment sensors and structurally integrated electronics	Department of Defense	\$4M
Metamagnetics Inc.	Canton, MA	2008	Northeastern University	8	Private	Microwave magnetic materials and devices	Department of Defense; National Science Foundation	\$4.2M

COMPANY	LOCATION	FOUNDED	UNIVERSITY	EMPLOYEES	STATUS	TECHNOLOGY	FUNDING AGENCY	AMOUNT
Mobitrac, Inc.	Englewood, CO	2001	University of Illinois at Chicago	N/A	Acquired	Software for efficient management of vehicle fleets	Department of Defense; National Science Foundation	\$1M
Myriad Genetics, Inc.	Salt Lake City, UT	1991	University of Utah	1,169	Public	Molecular diagnostic tools that test for the presence of specific genes	Department of Defense; National Institutes of Health	\$25M
Nabsys	Providence, RI	2004	Brown University	47	Private	High speed, low-cost DNA sequencing technology	National Science Foundation	\$1.5M
Nanofiber Solutions™	Columbus, OH	2009	Ohio State University	3	Private	Biologically realistic 3D in vivo cell culture environment	National Science Foundation	\$76,380
NanoPhotonica	Orlando, FL	2009	University of Florida	10	Private	Nanomaterials for solar panels and electronic devices	Department of Defense; Department of Energy	\$2.4M
Novobiotic	Cambridge, MA	2003	Northeastern University	15	Private	Technology cultivates "unculturable" microorganisms for antibiotic development	National Science Foundation	\$65,723
Ocugen Corporation	Penn Valley, PA	1997	Emory University	N/A	Acquired	Drugs for hemophilia and clotting disorders	National Institutes of Health	\$2.9M
Omnispeech, LLC	College Park, MD	2009	University of Maryland	7	Private	Speech extraction technology for digital mobile devices	National Institutes of Health; National Science Foundation	\$916,809
OrthoAccel Technologies Inc.	Bellaire, TX	2007	University of Illinois at Chicago	35	Private	Medical devices for dental care and orthodontic treatment	National Institutes of Health	\$1.3M
Phoebus Optoelectronics LLC	New York, NY	2003	The City University of New York	6	Private	Metamaterials for alternative energy, remote sensing and chemical/biological detection	Department of Defense; National Science Foundation	N/A

COMPANY	LOCATION	FOUNDED	UNIVERSITY	EMPLOYEES	STATUS	TECHNOLOGY	FUNDING AGENCY	AMOUNT
Physcient, Inc.	Durham, NC	2007	North Carolina State University	2	Private	Handheld, robotic surgical instruments	National Institutes of Health; National Science Foundation	\$241,355
Picarro, Inc.	Santa Clara, CA	1988	Stanford University	94	Private	High-precision gas analyzers and optical stable isotope measurement instruments	Department of Energy	N/A
Polyera Corporation	Skokie, IL	2006	Northwestern University	50	Private	High-performance semiconductor materials and inks	Department of Defense; NASA; National Science Foundation	\$1M
Quantum Signal, LLC	Saline, MI	1999	University of Michigan	40	Private	Advanced signal processing solutions for industrial applications	Department of Defense	\$500,000
RemoterReality	Westborough, MA	1997	Columbia University	6	Private	High-performance video systems for surveillance and situational awareness	Department of Defense; National Science Foundation	\$11M
RightCare Solutions, Inc.	Fort Washington, PA	2011	University of Pennsylvania	6	Private	Discharge planning and readmission management technology	National Institutes of Health	\$840,000
Sample6 Technologies	Boston, MA	2010	Boston University	16	Private	Rapid pathogen detection technology	National Institutes of Health; National Science Foundation	\$5M
Sand9	Cambridge, MA	2007	Boston University	34	Private	MEMS timing technology for electronics	National Science Foundation	\$2M
Science Take Out	Pittsford, NY	2008	University of Rochester	14	Private	Hands-on science activity kits for classrooms	National Institutes of Health	\$1.2M
Senomyx, Inc.	San Diego, CA	1998	University of California, San Diego	112	Public	New flavor ingredients that reduce need for salt, MSG, and sugar	National Institutes of Health	\$2.03M

COMPANY	LOCATION	FOUNDED	UNIVERSITY	EMPLOYEES	STATUS	TECHNOLOGY	FUNDING AGENCY	AMOUNT
SoundCure	San Jose, CA	2009	University of California, Irvine	30	Private	Patterned sound technology for suppression of tinnitus	National Institutes of Health	\$2M
SpectraFluidics	Goleta, CA	2007	University of California, Santa Barbara	N/A	Private	Products for rapid, low-level chemical detection	Department of Defense; National Science Foundation	\$430,000
Steady State Imaging, LLC	Minneapolis, MN	2011	University of Minnesota	5	Acquired	Advanced MRI technology	National Institutes of Health	\$9.8M
Stony Brook Biotechnology	Stony Brook, NY	2004	Stony Brook University	1	Private	Biomarkers for diagnosis of essential thrombocythemia	National Institutes of Health	\$1M
Strategic Polymers Inc.	State College, PA	2006	Pennsylvania State University	20	Private	Technologies for electro-mechanical actuators	Department of Defense	\$9.5M
SyntheZyme	Brooklyn, NY	2008	New York University	4	Private	Bio-based industrial chemicals	Department of Defense	\$4.5M
TAG Optics Inc.	Princeton, NJ	2011	Princeton University	3	Private	Tunable acoustic gradient (TAG) optical lens focuses in response to sound waves	Department of Defense	\$300,000
Tivrosan Pharmaceuticals	Providence, RI	2008	Brown University	6	Private	Protein therapeutics for serious neuromuscular disorders	National Institutes of Health; National Science Foundation	N/A
ToleroGenics	Chicago, IL	2007	University of Illinois at Chicago	2	Private	Pharmaceutical treatments for autoimmune diseases	National Institutes of Health	\$4.7M
Tonus Therapeutics	Williamsville, NY	2009	University at Buffalo	4	Private	Drugs for diseases involving biomechanics, including muscular dystrophy	National Institutes of Health	\$15M

COMPANY	LOCATION	FOUNDED	UNIVERSITY	EMPLOYEES	STATUS	TECHNOLOGY	FUNDING AGENCY	AMOUNT
Trak Surgical, Inc.	Omaha, NE	2012	University of Nebraska	4	Private	Freehand navigation/computer-aided orthopedic surgery technology	Department of Defense	\$4.2M
Transphorm	Goleta, CA	2007	University of California, Santa Barbara	75	Private	Ultra-efficient electric power conversion	Department of Defense	\$9.4M
Tribogenics	Marina del Rey, CA	2011	University of California, Los Angeles	15	Private	Miniature, ultra-portable X-rays	Department of Defense	\$500,000
TYRX, Inc.	Monmouth Junction, NJ	1988	Rutgers University	50	Private	Implantable drug/device products to reduce surgical site infection	National Institutes of Health	\$738,000
Virent, Inc.	Madison, WI	2002	University of Wisconsin-Madison	120	Private	Technology converts plant-based sugars into hydrocarbon products	Department of Energy	\$27.5M
WatchStander	Fort Lauderdale, FL	2011	Pennsylvania State University	3	Private	Maritime piracy defense technologies	Department of Defense	\$350,200
Wisegene	Chicago, IL	2012	University of Chicago	2	Private	Research tools for genomic sequencing and detection technology	National Institutes of Health	\$2.13M
WITricity Corporation	Watertown, MA	2007	Massachusetts Institute of Technology	50	Public	Technology for wireless electric power transfer	Department of Defense; Department of Energy; National Science Foundation	N/A
Xerion Advanced Battery Corp	Westminster, CO	2010	University of Illinois at Urbana-Champaign	11	Private	Ultra-high power, high-energy lithium ion batteries	Department of Defense; Department of Energy	\$11M
Zomega Terahertz Corporation	East Greenbush, NY	2005	Rensselaer Polytechnic Institute	11	Private	Terahertz-based wave technology for non-invasive, non-destructive materials testing	Department of Defense; National Science Foundation	\$2M

SPARKING ECONOMIC GROWTH 2.0

Companies Created from
Federally Funded University
Research, Fueling American
Innovation and Economic Growth

COMPANIES BY UNIVERSITY

Auburn University

HaloSource, Inc.

Boston University

Allegro Diagnostics
Sample6 Technologies
Sand9

Brown University

Nabsys
Tivorsan Pharmaceuticals

The City University of New York

Phoebus Optoelectronics LLC

Columbia University

RemoteReality

Dartmouth College

Glycofi
ImmuNext

Emory University

Clearside Biomedical, Inc.
Inhibikase Therapeutics, Inc.
Octagen Corporation

Harvard University

Diagnostics for All (DFA)
Genocea Biosciences
Infinity Pharmaceuticals

Johns Hopkins University

Cureveda LLC

Massachusetts Institute of Technology

Akamai Technologies, Inc.
WiTricity Corporation

New York University

SyntheZyme

North Carolina State University

Agile Sciences, Inc.
Galaxy Diagnostics, Inc.
ImagineOptix
Physcient, Inc.

Northeastern University

Akrivis Technologies
Metamagnetics Inc.
Novobiotic

Northwestern University

American BioOptics
Polyera Corporation

Ohio State University

Nanofiber Solutions™

Pennsylvania State University

Melanovus Oncology
Strategic Polymers Inc.
WatchStander

Princeton University

Aculon, Inc.
Liquid Light
TAG Optics Inc.

Rensselaer Polytechnic Institute

Crystal IS, Inc.
Zomega Terahertz Corporation

Rutgers University

TYRX, Inc.

Stanford University/SLAC

KAI Pharmaceuticals
Lyncean Technologies, Inc.
Picarro, Inc.

Stony Brook University

General Sentiment
MesoScribe Technologies Inc.
Stony Brook Biotechnology

Syracuse University

AptaMatrix
CollabWorx

Texas A&M University

framergy™
MacuCLEAR, Inc.

University at Buffalo

Tonus Therapeutics

University of California, Berkeley

Amyris, Inc.

University of California, Davis

Dysonics Corporation

University of California, Irvine

Hiperwall Inc.
SoundCure

University of California, Los Angeles

Holomic, LLC
Tribogenics

University of California, San Diego

Genomatica, Inc.
Senomyx, Inc.

University of California, Santa Barbara

Aurion
Eucalyptus Systems
SpectraFluidics
Transphorm

University of Chicago/Argonne National Lab

Advanced Diamond Technologies (ADT), Inc.
Wisegene

University of Colorado Boulder

ColdQuanta, Inc.
LineRate Systems, Inc.

University of Delaware

ET International, Inc.

University of Florida

Axogen
NanoPhotonica

University of Illinois at Chicago

Cell Biologics
Cell Habitats
EPIR Technologies
Immersive Touch
Mobitrac, Inc.
OrthoAccel Technologies Inc.
ToleroGenics

University of Illinois at Urbana-Champaign

Autonomic Materials, Inc.
Xerion Advanced Battery Corp

University of Iowa

Integrated DNA Technologies (IDT), Inc.

University of Kansas

CyDex Pharmaceuticals, Inc.

University of Kentucky

Hummingbird Nano Inc.

University of Maryland

OmniSpeech, LLC

University of Michigan

Lycera Corp
Quantum Signal, LLC

University of Minnesota

Heat Mining Company, LLC
Steady State Imaging, LLC

University of Nebraska

Ground Fluor Pharmaceuticals, Inc.
Trak Surgical, Inc.

University of Pennsylvania

Axonia Medical, Inc.
CytoVas, LLC
Graphene Frontiers
RightCare Solutions, Inc.

University of Rochester

Koning Corporation
Science Take Out

University of Utah

Myriad Genetics, Inc.

University of Wisconsin-Madison

Cellular Dynamics International (CDI), Inc.
Virent, Inc.

Washington State University

Food Chain Safety

Wayne State University

Advaita Corporation

Yale University

Koltan Pharmaceuticals, Inc.

SPARKING ECONOMIC GROWTH 2.0

Companies Created from
Federally Funded University
Research, Fueling American
Innovation and Economic Growth

COMPANIES BY FUNDING AGENCY

Department of Agriculture

HaloSource, Inc.

Department of Commerce

Immersive Touch

Department of Defense

Akamai Technologies, Inc.

Amyris, Inc.

Aurriion

Autonomic Materials, Inc.

Axon Medical, Inc.

ColdQuanta, Inc.

CollabWorx

Crystal IS, Inc.

CytoVas, LLC

EPIR Technologies

ET International, Inc.

Food Chain Safety

Graphene Frontiers

HaloSource, Inc.

Holomic, LLC

Koning Corporation

LineRate Systems, Inc.

Liquid Light

MesoScribe Technologies Inc.

Metamagnetics Inc.

Mobitrac, Inc.

Myriad Genetics, Inc.

NanoPhotonica

Phoebus Optoelectronics LLC

Polyera Corporation

Quantum Signal, LLC

RemoteReality

SpectraFluidics

Strategic Polymers Inc.

SyntheZyme

TAG Optics Inc.

Trak Surgical, Inc.

Transphorm

Tribogenics

WatchStander

WiTricity Corporation

Xerion Advanced Battery Corp

Zomega Terahertz Corporation

Department of Education

Hummingbird Nano Inc.

Department of Energy

Advanced Diamond Technologies (ADT), Inc.

EPIR Technologies

ET International, Inc.

framergy™

Heat Mining Company, LLC

Liquid Light

Lyncean Technologies, Inc.

NanoPhotonica

Picarro, Inc.

Virent, Inc.

WiTricity Corporation

Xerion Advanced Battery Corp

NASA

Holomic, LLC

Polyera Corporation

National Institutes of Health

Agile Sciences, Inc.

Akrivis Technologies

Allegro Diagnostics

American BioOptics

AptaMatrix

Axogen

Axon Medical, Inc.

Cell Biologics

Cell Habitats

Cellular Dynamics International (CDI), Inc.

Clearside Biomedical, Inc.

Cureveda LLC

CyDex Pharmaceuticals, Inc.

CytoVas, LLC

Diagnostics for All (DFA)

Galaxy Diagnostics, Inc.

Genocea Biosciences

Genomatica, Inc.

Glycofi

Holomic, LLC

Immersive Touch

ImmuNext

Infinity Pharmaceuticals

Inhibikase Therapeutics, Inc.

Integrated DNA Technologies (IDT), Inc.

KAI Pharmaceuticals

Koltan Pharmaceuticals, Inc.

Koning Corporation

Lycera Corp

Lyncean Technologies, Inc.

MacuCLEAR, Inc.

Melanovus Oncology

Myriad Genetics, Inc.

Octagen Corporation

OmniSpeech, LLC

National Institutes of Health *continued*

OrthoAccel Technologies Inc.
Physcient, Inc.
RightCare Solutions, Inc.
Sample6 Technologies
Science Take Out
Senomyx, Inc.
SoundCure
Steady State Imaging, LLC
Stony Brook Biotechnology
Tivorsan Pharmaceuticals
ToleroGenics
Tonus Therapeutics
TYRX, Inc.
Wisegene

National Science Foundation

Aculon, Inc.
Advaita Corporation
Agile Sciences, Inc.
Akamai Technologies, Inc.
Amyris, Inc.
Autonomic Materials, Inc.
Dysonics Corporation
EPIR Technologies
Eucalyptus Systems
framergy™
General Sentiment
Genomatica, Inc.
Graphene Frontiers
Ground Fluor Pharmaceuticals, Inc.
Heat Mining Company, LLC
Hiperwall Inc.
Hummingbird Nano Inc.
ImagineOptix
Liquid Light
Metamagnetics Inc.
Mobitrac, Inc.
Nabsys
Nanofiber Solutions™
Novobiotic
OmniSpeech, LLC
Phoebus Optoelectronics LLC
Physcient, Inc.
Polyera Corporation
RemoteReality
Sample6 Technologies
Sand9
SpectraFluidics
Tivorsan Pharmaceuticals
WiTricity Corporation
Zomega Terahertz Corporation

SPARKING ECONOMIC GROWTH 2.0

Companies Created from
Federally Funded University
Research, Fueling American
Innovation and Economic Growth

COMPANIES BY STATE

California

Aculon, Inc.
Amyris, Inc.
Aurrion
CyDex Pharmaceuticals, Inc.
Dysonics Corporation
Eucalyptus Systems
Genomatica, Inc.
Hiperwall Inc.
Holomic, LLC
KAI Pharmaceuticals
Lyncean Technologies, Inc.
Picarro, Inc.
Senomyx, Inc.
SoundCure
SpectraFluidics
Transphorm
Tribogenics

Colorado

ColdQuanta, Inc.
LineRate Systems, Inc.
Mobitrac, Inc.
Xerion Advanced Battery Corp

Connecticut

Kolltan Pharmaceuticals, Inc.

Delaware

ET International, Inc.

Florida

Axogen
NanoPhotonica
WatchStander

Georgia

Clearside Biomedical, Inc.
Inhibikase Therapeutics, Inc.

Illinois

Advanced Diamond Technologies (ADT), Inc.
American BioOptics
Autonomic Materials, Inc.
Cell Biologics
Cell Habitats
EPIR Technologies
Immersive Touch
Polyera Corporation
ToleroGenics
Wisegene

Iowa

Integrated DNA Technologies (IDT), Inc.

Kentucky

Hummingbird Nano Inc.

Maryland

Cureveda LLC
OmniSpeech, LLC

Massachusetts

Akamai Technologies, Inc.
Akrivis Technologies
Allegro Diagnostics
Diagnostics for All (DFA)
Genocea Biosciences
Infinity Pharmaceuticals
Metamagnetics Inc.
Novobiotic
RemoteReality
Sample6 Technologies
Sand9
WiTricity Corporation

Michigan

Advaita Corporation
Axonia Medical, Inc.
Lycera Corp
Quantum Signal, LLC

Minnesota

Steady State Imaging, LLC

Nebraska

Ground Fluor Pharmaceuticals, Inc.
Trak Surgical, Inc.

New Hampshire

Glycofi
ImmuNext

New Jersey

Liquid Light
TAG Optics Inc.
TYRX, Inc.

New York

AptaMatrix
CollabWorx
Crystal IS, Inc.
General Sentiment
Koning Corporation
MesoScribe Technologies Inc.
Phoebus Optoelectronics LLC
Science Take Out
Stony Brook Biotechnology
SyntheZyme
Tonus Therapeutics
Zomega Terahertz Corporation

North Carolina

Agile Sciences, Inc.
Galaxy Diagnostics, Inc.
ImagineOptix
Physcient, Inc.

Ohio

Nanofiber Solutions™

Pennsylvania

CytoVas, LLC
Graphene Frontiers
Melanovus Oncology
Octagen Corporation
RightCare Solutions, Inc.
Strategic Polymers Inc.

Rhode Island

Nabsys
Tivorsan Pharmaceuticals

South Dakota

Heat Mining Company, LLC

Texas

framergy™
MacuCLEAR, Inc.
OrthoAccel Technologies Inc.

Utah

Myriad Genetics, Inc.

Washington

Food Chain Safety
HaloSource, Inc.

Wisconsin

Cellular Dynamics International (CDI), Inc.
Virent, Inc.

SPARKING ECONOMIC GROWTH 2.0

Companies Created from
Federally Funded University
Research, Fueling American
Innovation and Economic Growth

COMPANIES BY INNOVATION

Biomedical

Akrivis Technologies
Allegro Diagnostics
American BioOptics
Axogen
Axonia Medical, Inc.
Cell Habitats
Clearside Biomedical, Inc.
Cureveda LLC
CyDex Pharmaceuticals, Inc.
CytoVas, LLC
Diagnostics for All (DFA)
Galaxy Diagnostics, Inc.
Genocea Biosciences
Glycofi
Ground Fluor Pharmaceuticals, Inc.
Holomic, LLC
Immersive Touch
ImmuNext
Infinity Pharmaceuticals
Inhibikase Therapeutics, Inc.
KAI Pharmaceuticals
Kolltan Pharmaceuticals, Inc.
Koning Corporation
Lycera Corp
MacuCLEAR, Inc.
Melanovus Oncology
Myriad Genetics, Inc.
Nabsys
Novobiotic
Octagen Corporation
OrthoAccel Technologies Inc.
Physcient, Inc.
Steady State Imaging, LLC
Stony Brook Biotechnology
Tivorsan Pharmaceuticals
ToleroGenics
Tonus Therapeutics
Trak Surgical, Inc.
TYRX, Inc.
Wisegene

Defense & Safety

AptaMatrix
Food Chain Safety
HaloSource, Inc.
RemoteReality
Sample6 Technologies
SpectraFluidics
WatchStander
Zomega Terahertz Corporation

Education

Science Take Out

Energy & Chemicals

Agile Sciences, Inc.
Amyris, Inc.
framergy™
Genomatica, Inc.
Heat Mining Company, LLC
Liquid Light
Lyncean Technologies, Inc.
Phoebus Optoelectronics LLC
SyntheZyme
Transphorm
Virent, Inc.
WiTricity Corporation
Xerion Advanced Battery Corp

Manufacturing, Research & Industry

Cell Biologics
Cellular Dynamics International (CDI), Inc.
ColdQuanta, Inc.
Hummingbird Nano Inc.
Integrated DNA Technologies (IDT), Inc.
MesoScribe Technologies Inc.
Picarro, Inc.
Quantum Signal, LLC
Senomyx, Inc.
Strategic Polymers Inc.
Tribogenics

Materials

Aculon, Inc.
Advanced Diamond Technologies (ADT), Inc.
Aurion
Autonomic Materials, Inc.
Crystal IS, Inc.
EPIR Technologies
Graphene Frontiers
Metamagnetics Inc.
Nanofiber Solutions™
NanoPhotonica
Polyera Corporation

Technology & Web

Advaita Corporation
Akamai Technologies, Inc.
CollabWorx
Dysonics Corporation
ET International, Inc.
Eucalyptus Systems
General Sentiment
Hiperwall Inc.
ImagineOptix
LineRate Systems, Inc.
Mobitrac, Inc.
OmniSpeech, LLC
RightCare Solutions, Inc.
Sand9
SoundCure
TAG Optics Inc.

SPARKING ECONOMIC GROWTH 2.0

Companies Created from
Federally Funded University
Research, Fueling American
Innovation and Economic Growth

COMPANIES BY YEAR FOUNDED

1987

Integrated DNA Technologies (IDT), Inc.

1991

Myriad Genetics, Inc.

1993

CyDex Pharmaceuticals, Inc.

1997

Crystal IS, Inc.
Octagen Corporation
RemoteReality

1998

EPIR Technologies
HaloSource, Inc.
Picarro, Inc.
Senomyx, Inc.
TYRX, Inc.

1999

Akamai Technologies, Inc.
Quantum Signal, LLC

2000

CollabWorx
ET International, Inc.
Genomatica, Inc.
Glycofi

2001

Infinity Pharmaceuticals
Mobotrac, Inc.

2002

Axogen
Koning Corporation
Lyncean Technologies, Inc.
MesoScribe Technologies Inc.
Virent, Inc.

2003

Aculon, Inc.
Advanced Diamond Technologies (ADT), Inc.
Amyris, Inc.
AptaMatrix
Novobiotic
Phoebus Optoelectronics LLC

2004

Cellular Dynamics International (CDI), Inc.
ImagineOptix
Nabsys
Stony Brook Biotechnology

2005

Advaita Corporation
Autonomic Materials, Inc.
Cell Habitats
Immersive Touch
Zomega Terahertz Corporation

2006

American BioOptics
Genocea Biosciences
Lycera Corp
MacuCLEAR, Inc.
Polyera Corporation
Strategic Polymers Inc.

2007

Agile Sciences, Inc.
Aurrion
ColdQuanta, Inc.
Diagnostics for All (DFA)
Galaxy Diagnostics, Inc.
Kolltan Pharmaceuticals, Inc.
OrthoAccel Technologies Inc.
Physcient, Inc.
Sand9
SpectraFluidics
ToleroGenics
Transphorm
WiTricity Corporation

2008

Allegro Diagnostics
General Sentiment
Hiperwall Inc.
LineRate Systems, Inc.
Metamagnetics Inc.
Science Take Out
SyntheZyme
Tivorsan Pharmaceuticals

2009

Akrivis Technologies
Axonia Medical, Inc.
Eucalyptus Systems
Liquid Light
Nanofiber Solutions™
NanoPhotonica
OmniSpeech, LLC
SoundCure
Tonus Therapeutics

2010

Cureveda LLC
CytoVas, LLC
Food Chain Safety
Graphene Frontiers
ImmuNext
Inhibikase Therapeutics, Inc.
Sample6 Technologies
Xerion Advanced Battery Corp

2011

Cell Biologics
Clearside Biomedical, Inc.
Dysonics Corporation
framergy™
Holomic, LLC
RightCare Solutions, Inc.
Steady State Imaging, LLC
TAG Optics Inc.
Tribogenics
WatchStander

2012

Ground Fluor Pharmaceuticals, Inc.
Heat Mining Company, LLC
Hummingbird Nano Inc.
KAI Pharmaceuticals
Melanovus Oncology
Trak Surgical, Inc.
Wisegene

SPARKING ECONOMIC GROWTH 2.0

Companies Created from
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Research, Fueling American
Innovation and Economic Growth

SPARKING ECONOMIC GROWTH — 2010 COMPANIES OPERATIONAL IN 2013

Acoustic Magic Inc.

Adenosine Therapeutics, LLC

Advanced Body Sensing, LLC

Advaxis, Inc.

Agensys, Inc.

(part of Astellas Pharma US)

ALEKS Corporation

Allylix Inc.

Amati Communications Corporation

(part of Texas Instruments)

Arbor Networks

ArmaGen Technologies, Inc.

Audyssey Laboratories

Aursos Inc.

Avid Radiopharmaceuticals, Inc.

(part of Eli Lilly and Company)

AzERx, Inc.

(part of Capstone Therapeutics)

Banyan Biomarkers, Inc.

BioMarck Pharmaceuticals, Ltd.

BioNanomatrix, Inc.

(rebranded as BioNano Genomics)

BioResource International

Buffalo BioBlower Technologies

Cadence Design Systems

Cerulean Pharma, Inc.

Chromatin, Inc.

Cisco Systems, Inc

Cognex Corporation

CREE, Inc.

Directed Vapor Technologies International, Inc.

Eden Park Illumination, Inc.

FAST Diagnostics, Inc.

FluGen, Inc.

Genentech, Inc.

(part of the Roche Group)

GeoVax Labs, Inc.

Google Inc.

HealthMedia, Inc.

*(now Wellness & Prevention, Inc.,
part of Johnson & Johnson)*

iCardiac Technologies

Image Sensing Systems Inc.

ImagiSonix

ImmuneWorks

Integrated Genomics

(rebranded as igenbio, Inc.)

iRobot Corporation

J.A. Woollam, Co. Inc.

Kinex Pharmaceuticals

Kionix Inc.

(part of ROHM Co. Ltd.)

Language Weaver

LI-COR Biosciences

Maroon Biotech

Mersive Technologies

MicroMRI, Inc.

Molecular Imaging, Inc.

(part of Agilent Technologies, Inc.)

Molecular Imprints, Inc.

Momenta Pharmaceuticals, Inc.

Nanopharma Technologies, Inc.

NanoSonic, Inc.

Natura Therapeutics, Inc.

ONY, Inc.

Orbital Science Corporation

Pacific BioSciences

Pharmasset, Inc.

(part of Gilead Sciences)

Praxis Biologics

(part of Pfizer)

Protea Bioscience, Inc.

RainDance Technologies

Reactive NanoTechnologies, Inc.

(part of Indium Corp.)

Response Genetics, Inc.

Saneron-CCEL Therapeutics, Inc.

**Sparking Economic Growth 2010 Companies
Operational in 2013 *continued***

SAS

Seaside Therapeutics

Semprius

Sharklet Technologies, Inc.

Sinmat

Solarmer Energy, Inc.

Spin Transfer Technologies

Sun Microsystems, Inc.
(part of Oracle)

SunPower Corporation

Syntermed, Inc.

TetraLogic Pharmaceuticals

TetraVitae Bioscience
(part of Eastman Chemical Company)

Therametric Technologies, Inc.

ThermoAnalytics, Inc.

TomoTherapy Incorporated
(part of Accuray)

Transgenex Nanobiotech, Inc.

Triangle Pharmaceuticals
(part of Gilead Sciences)

Universal Display Corporation

Vaccinex, Inc.

Verenium Corporation

VGX Pharmaceuticals
(part of Inovio Biomedical)

Virtual Incision Corporation

Vorbeck Materials, Inc.

Xenogen
(part of PerkinElmer)

Ximerex, Inc.

Zymetis, Inc.
(part of Aemetis)



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