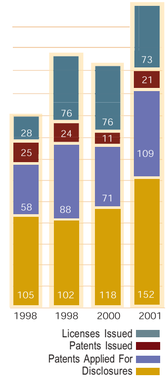
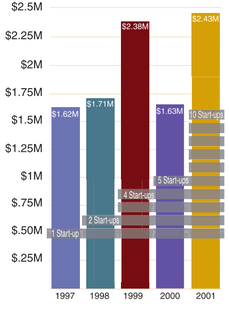
OTC Activity by Year



Income and Start-up Companies



technology commercialization

Office of Technology Commercialization

This past year, we have seen a doubling in the number of start-up companies emerging from Purdue University and based on Purdue research. The infrastructure has grown and is continuing to develop to encourage these new companies to be formed. Inventions and copyright disclosures grew 30 percent over last year, new patents filed for doubled, and the number of license agreements with companies rose from 266 to 322. Two examples of Purdue-licensed start-up companies are Endocyte and Griffin Analytical Technologies, both profiled in the next column.

OTC provides a comprehensive support system for working with companies on all types of commercialization projects, from patent filing, market assessments, and development funding to business strategy and investment.

OTC works closely with Purdue inventors when disclosing their new intellectual property by determining protectability and market potential. Our marketing activities help identify target companies for collaborative agreements. An assessment of the most successful commercialization path is made, whether it is licensing to an existing company, forming a new company, or some combination of the two.

If a decision is made to pursue a start-up company, OTC works to provide assistance to the new firm. OTC also educates the University community about intellectual property and start-ups through targeted seminars, newsletters, and OTC Outreach Program Events.

Lisa Kuuttila
Assistant Vice President Technology Commercialization
www.otc.purdue.edu

licensed technologies

Griffin Analytical Technologies, Inc. is committed to providing the scientific community with affordable, portable and functional chemical analysis instrumentation. To this end, GAT licensed proprietary Purdue technology to deliver a miniaturized mass spectrometer (MMS) to the analytical instrumentation markets. Mass spectrometry provides identification and quantification of chemical targets for the pharmaceutical, biotechnological, automotive, chemical, environmental, consumer product, and petroleum industries. GAT will deliver a MMS at a competitive cost and expand the applications and markets of mass spectrometry. GAT has offices and a research laboratory located at the Purdue Technology Center.

Endocyte, Inc., founded in 1996, is a biotechnology company focused on vitamin-based drug targeting and delivery systems. Vitamins are essential components for specific biological cellular functions. Endocyte's mission is to use vitamins as "Trojan horses" to target and deliver diagnostic and therapeutic agents into cells for treatment of diseases. Endocyte's lead project is the use of the vitamin folate to target and deliver anti-cancer agents. Purdue Research Foundation's Office of Technology Commercialization, has licensed the drug delivery technology to Endocyte under an exclusive commercial arrangement. Endocyte is located in Purdue Research Park in West Lafayette.

partnerships

Industry Research & Technology Programs

Engagement is a cornerstone in the mission of Purdue University. Over the years, Purdue researchers have forged innovative partnerships resulting in significant gains by all the stakeholders.

A recent joint venture between Purdue, Indiana University, and Eli Lilly and Company is described in the next column.

In March 2002, Purdue and Central Indiana Corporate Partnerships sponsored an Advanced Manufacturing Summit in an effort to facilitate dialogue between education, business and government. More than 400 leaders of manufacturing enterprises met at Purdue's West Lafayette campus to discuss advanced manufacturing and the policies and collaborations needed to propel the economy of Indiana into the future.

Parallel sessions were conducted on products and industry sectors as well as numerous crosscutting subtopics. The meeting was important to Purdue; James J. Solberg, Ransburg Professor of Manufacturing, stated prior to the conference, "We at the University want to do more listening than talking at the summit to determine the needs and challenges of manufacturers in the state."

Comments from the summit participants suggest that we need to hold a summit on advanced manufacturing each year. Purdue and industry leaders are now in discussions about possible ways to make the U.S. and Indiana manufacturing more efficient and more competitive in the "new economy."

John Schneider
Assistant Vice President for Industry Research
www.purdue.edu/Research/IRTPOffice/IRTP-home.html

joint venture

Indiana Proteomics Consortium

Purdue, Indiana University, and Eli Lilly and Company are partners in a new model of academic and private sector interaction — the Indiana Proteomics Consortium. The intent of this Consortium is to use the exceptional analytical chemistry skills at Purdue and IU and the knowledge of pharmaceuticals at Lilly to develop analytical tools and equipment that will assist in understanding the complex interactions and chemistry of proteomics.

Proteomics, the study of the structural characteristics and diverse interactions that occur at the molecular level between proteins and ligands, continues to grow in importance for the discovery of ways to solve complex medical problems. The Bindley Bioscience Center in Discovery Park is a major contributor to the research infrastructure of the Indiana Proteomics Initiative.

An example of the research fostered within the Indiana Proteomics Consortium involves identifying and studying proteins formed in living systems when specific genes are activated. An objective of this research is the creation of a new generation of devices that will allow the rapid analysis of the components in living cells. This research will generate new and important knowledge of how cells are regulated and respond to chemicals, mutations, environmental stimuli, age, disease and pathogens.

homeland security

The tragedy of September 11, 2001, combined with the anthrax attacks, affected how we live and energized Purdue research activities aimed at making the world a safer place. Purdue faculty submitted more than 50 proposals in response to a request for proposals to combat terrorism from the Department of Defense. A conference entitled "Indiana Homeland Security Simulation" organized by the Purdue E-Business Research Center was held at the West Lafayette campus in April with several leaders from industry and government in attendance.

Interest in homeland security is widespread across the campus. In order to assist the faculty and the private and government sectors, Purdue is establishing a Homeland Security Institute. Dennis Engi, head of the School of Industrial Engineering, will be the interim director. An internal council of faculty across all disciplines and research interests and an external council of government and industry leaders are helping develop a strategy for the institute. The institute will be organized into four major areas:

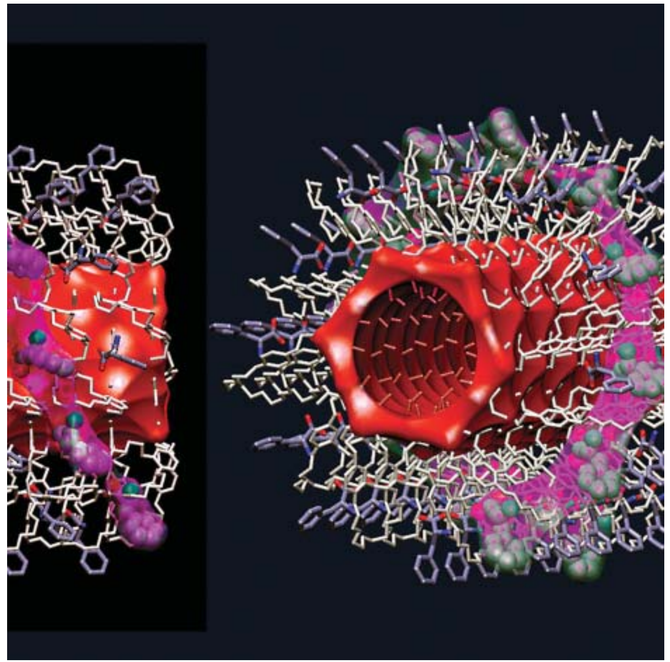
- Information analysis and infrastructure protection
- Chemical, biological, radiological, and nuclear countermeasures
- Border and transportation security
- Emergency preparedness and response

Purdue's primary focus areas for research are: computer security, food security, chemistry/nuclear detection, bio-detection, aviation, infrastructure/transportation, emergency preparedness and simulation, power grid security and viral/vaccine initiatives.

PURDUE
UNIVERSITY

sponsored program activities

2001-02 Annual Report from the Office of the Vice President for Research



A self-assembled rosette nanotube prepared in the laboratory of Hicham Fenniri, assistant professor of chemistry. These materials are now made with predefined chiroptical, physical and chemical properties. The Fenniri group's nanotubes promote their own formation that may someday be used to manufacture "molecular photonic and electronic wires," artificial channel systems and biosensors. Funding is provided by the National Science Foundation, the American Chemical Society, 3M, the Research Corporation and Purdue University.

PURDUE
UNIVERSITY

sponsored program awards 2001-02

Sources of Research Funding

Total Sponsored Program Awards 2001-02

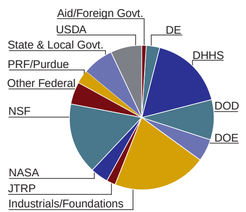
Federal
$136,166,664
67%

Industry/Foundations
$43,493,070
21%

PRF/Purdue
$6,339,117
3%

State/Local Governments
$17,975,391
9%

Foreign Governments
$296,511
< 1%



Total Awards Funded

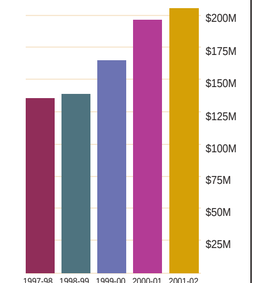
$204,270,753
4% increase

2000-2001
$196,606,500
19% increase

1999-2000
165,507,176
18% increase

1998-1999
$139,758,942
2% increase

1997-1998
$136,645,726
1% increase



Message from the President

Discovery Park is a cornerstone for Purdue's efforts to assume leadership in the new economy. All four of its centers were selected because they reflect or promote economic niches the State of Indiana hopes to develop. *— Martin C. Jischke*

Message from the Provost

Research continues to be a major focus on the Purdue campus, especially interdisciplinary research. One of the ways in which we plan to enhance our ability to do interdisciplinary research is through Discovery Park. No longer will research be restricted by department or school boundaries. Increasingly, research that will translate into future technologies and products that save lives and improve lives will be undertaken by teams of faculty from a number of disciplines. Discovery Park will contain the laboratories and be the incubator of ideas for these researchers. *— Sally Frost Mason*

Message from the Vice President for Research and Dean of the Graduate School

Because of the hard work and dedication of Purdue's talented research teams, our total sponsored program awards reached a record $204 million in 2001-02. We commend all faculty at Purdue for their important research endeavors.

Faculty and staff are to be credited for building strong multidisciplinary research partnerships. These partnerships are essential for developing the new technologies that will contribute to solving complex issues.

Discoveries that have evolved out of several research partnerships led to the establishment of Discovery Park — a highly multidisciplinary research conclave of scholars contributing to discoveries in basic research, new technologies, and a broad educational experience for future generations of Purdue students.

Four major centers planned for Discovery Park are highlighted in this report. Discovery Park will play a lead role by building on partnerships and encouraging the engagement of other stakeholders to join the dialogue of new discovery. *— Gary E. Isom*

discovery park at purdue university encompasses ...

Nano is a prefix meaning one-billionth. A nanometer is one-billionth of a meter.

1

Discovery Park *was born of a concept of interdisciplinary research that bridges diverse disciplines of science and engineering. Integral to cross-disciplinary research is the involvement of entrepreneurs to develop business plans for launching companies to deliver the resulting technology to the Indiana economy.*

The Discovery Park concept has generated considerable interest on the part of benefactors and legislators. In just a few months, almost $100 million has been contributed to construct Discovery Park buildings. The Lilly Endowment Foundation has provided a $26 million grant to fund the first programs of Discovery Park.

Four multimillion-dollar research grants from private and federal sources have already been received to fund specific multidisciplinary research projects. Discovery Park has energized faculty and students from across campus to think beyond the traditional disciplines of science and engineering to include ideas that had previously been confined to science fiction.

Charles O. Rutledge, Executive Director
Professor of Pharmacology and former Dean of the Schools of Pharmacy, Nursing, and Health Sciences

2

nanotechnology

Birck Nanotechnology Center

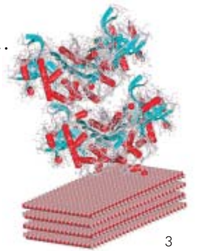
Research on materials and devices at the nanoscale level promises to accelerate the growth in microelectronics, biotechnology and materials processing.

Purdue University researchers have been pushing the physical boundaries of scale for more than 15 years. The Birck Nanotechnology Center positions Purdue to continue to push those boundaries by providing ultra-clean environmental laboratories for nanoscale research and high-tech instrumentation, such as atomic force microscopes capable of detecting and manipulating individual atoms, molecular beam epitaxy systems for growth of materials with single atomic layer precision, and chemical vapor deposition equipment for deposition of exotic new materials.

The mission of the Birck Nanotechnology Center in Discovery Park is to bring together researchers from a variety of disciplines to engage in collaborative, team-based multidisciplinary research. The laboratories are designed to accommodate researchers from distinctly different fields. Partnerships with the Bindley Bioscience Center are a critical focus for the development of emerging biotechnologies.

The Birck Nanotechnology Center has already played a pivotal role in bringing two high-profile research programs to Purdue. In July, NASA selected Purdue to lead a $15 million "Institute for Nanoelectronics and Computing", and in September, NSF awarded Purdue $10.5 million to establish a national "Network for Computational Nanotechnology." Both of these proposals benefited from equipment cost-sharing and space commitments provided by the Birck Nanotechnology Center.

James Cooper, Co-Director
Professor of Electrical and Computer Engineering
Richard Schwartz, Co-Director
Professor of Electrical and Computer Engineering, and former Dean of the Schools of Engineering



3

bioscience/engineering

Bindley Bioscience Center

The Bindley Bioscience Center promotes interdisciplinary research blending life sciences and engineering to create enabling technologies that bear on important biological and medical problems. In conjunction with all of Discovery Park, the goal is to bring these new technologies to the marketplace.

The center's areas of research include proteomics (analysis of proteins when specific genes are activated); bionanotechnology and biomicrotechnology; spectroscopy-microscopy for cellular and tissue imaging; tissue engineering and bioinformatics; and systems modeling. An example is research by the Indiana Proteomics Consortium, a joint venture of Purdue, IU, and Eli Lilly and Company, whose objective is the creation of a new generation of devices that will allow the rapid analysis of the components in living cells. This research will reveal how cells are regulated and respond to chemicals, mutations, environmental stimuli, age, disease and pathogens.

The center connects researchers in the life sciences with nanotechnology engineering in the Birck Nanotechnology Center. Researchers in biomedical engineering, electrical engineering, medicinal chemistry and other fields already are at work designing tiny electronic devices that use proteins, DNA and even living cells to rapidly detect substances in blood, air, water and food.

Genomics and proteomics are opening future opportunities in tissue engineering — creating materials that can mimic, repair and regenerate biological tissues and promote self healing.

V. Jo Davisson, Co-Director
Professor of Medicinal Chemistry and Molecular Pharmacology
George Wodicka, Co-Director
Head of Biomedical Engineering, Professor of Electrical and Computer Engineering

4

e-enterprise

e-Enterprise Center

The mission of the e-Enterprise Center is to foster and advance research involving information technology in combination with other technologies. Areas of interest in e-enterprise include advanced life support system design and management, homeland security, air traffic management, supply chain optimization and management, logistics, pharmaceutical product lifecycle management and supply chain, data mining and data fusion.

The e-Enterprise Center will pull together new technology activities with a special focus on three core areas: network security and reliability; management of distributed e-enterprises, including database systems; logistics and distribution of products and marketing of e-enterprises.

Partner Centers in e-Enterprise

- Center for E-Business Education and Research
- Purdue E-Business Research Center
- Center for Education and Research Information Assurance and Security
- Laboratory for Extended Enterprises at Purdue
- Digital Enterprise Center
- Dauch Center for Management of Manufacturing Enterprises
- Indiana Center for Database Systems
- Center for Collaborative Manufacturing
- Center for Customer-Driven Quality
- Computer Integrated Process Operations Center
- Center for Distributed Product Management
- Center for Technology Roadmapping
- Product Informatics Center

Joseph Pekny, Director
Professor of Chemical Engineering

5

entrepreneurship

The Burton D. Morgan Center for Entrepreneurship

The Burton D. Morgan Center for Entrepreneurship brings together all of Discovery Park's efforts to put the University's research into the marketplace.

The center fulfills an educational mission for students and faculty through various entrepreneurial initiatives, course work, presentations by noted academics and practitioners, symposia and practical application of principles learned.

Located at the center:

- The **Technology Transfer Initiative** assists faculty who research issues industry encounters when trying to license and market new technologies and products. The **Innovation Realization Laboratory** pairs engineering and management graduate students on projects to help them understand the way research relates to social and commercial needs. It also helps faculty design courses to teach entrepreneurship.
- The **Burton D. Morgan Entrepreneurial Competition** provides cash prizes to encourage engineering and management students to work together to present business plans for new products or services and show how they could be developed into profitable businesses.
- Part of the **Purdue Engineering Projects in Community Service** (EPICS) program gives undergraduates opportunities to work with community service agencies to find ways to use technology to solve problems and improve services.
- The **New Ventures Laboratory** enables entrepreneurs and venture capitalists to visit campus and conduct workshops and also will provide students with the opportunity to administer a venture fund investing in new technologies.

Richard Cosier, Director
Krannert School Dean and Leeds Professor of Management

images

1. *An excimer laser machining system is used to fabricate microstructures in polymer films. Since the photon energy from the excimer laser beam is higher than the bonding energy of most organic materials, the machining process is a photo-dissociation process, resulting in clean machined structures. These microstructures can have many applications in micro-electro-mechanical systems (MEMS), particularly bio-MEMS because of their low cost and biocompatibility.*
2. *A rare view down the growth chamber tube of the chemical vapor deposition epitaxial growth reactor.*
3. *Purdue researchers are using protein sorbed to nanoparticles to study the surface chemistry of antigen-adjuvant interactions used in human and animal vaccines. Surface characterization is used to learn how small these particles are, since the size of the particle plays an important role in determining the overall effectiveness of the vaccine.*
4. *A graphic illustration of the prevalence of information technology across the globe.*
5. *East and south view sketches of the Burton D. Morgan Center for Entrepreneurship. The building will house the New Ventures Laboratory, Burton D. Morgan Entrepreneurial Competition, Technology Transfer Initiative and Engineering Projects in Community Service Program.*