

2010 Research Centers



South Dakota
Research & Commercialization

South Dakota
DEPARTMENT OF TOURISM *and* STATE DEVELOPMENT

Oversight of 2010 Research Centers



2010 Research Center Funding Explanation

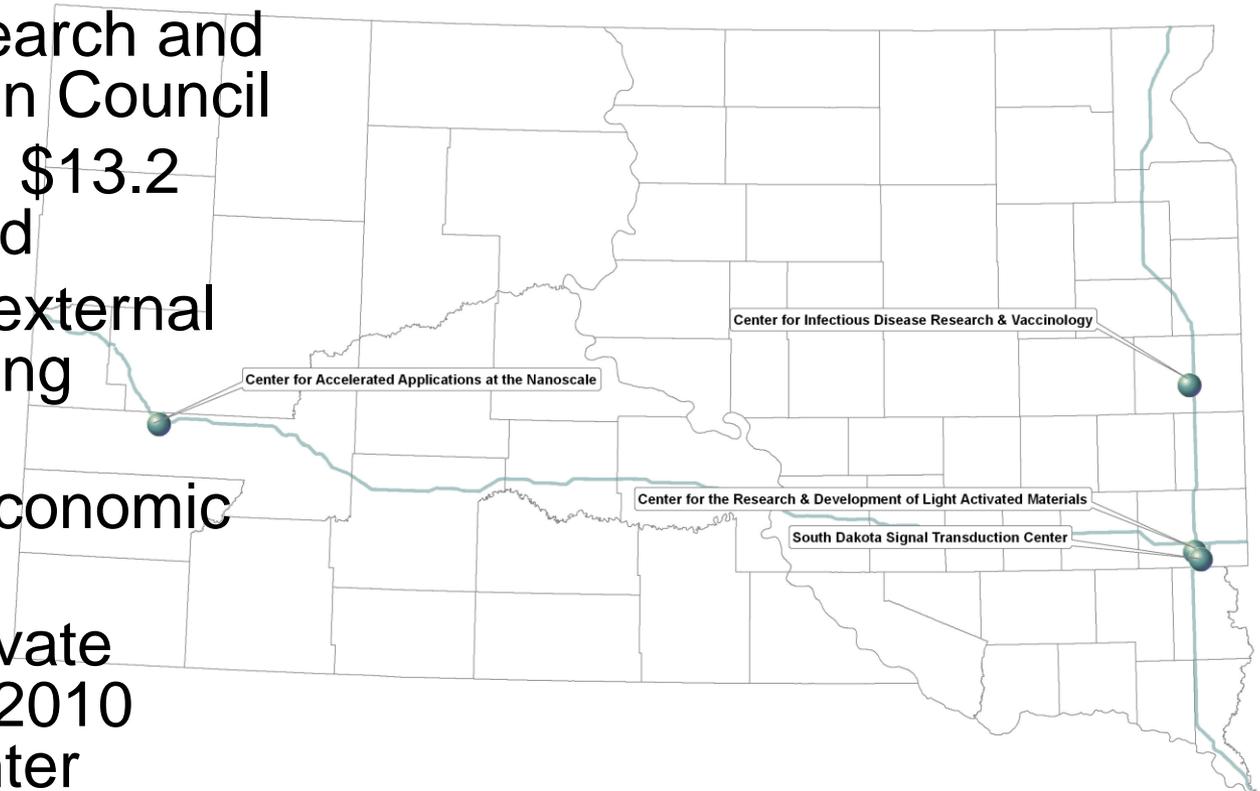


Original Four 2010 Research Centers: Investment & Return

Four 2010 Research Centers were selected in 2004 by the Research and Commercialization Council

- FY 2004-2009 \$13.2 million invested
- \$78 million in external research funding received
- \$132 million economic impact
- \$20 million private investment in 2010 Research Center associated businesses

Original 2010 Research Centers



Source: 2010 Center Semi-Annual Reports



Three of Original 2010 Research Centers Self-Sustaining and Growing

- FY 2008 RCC terminated state funding of Nanotechnology Center
- July 2009 state 2010 funding, \$2.2 million, ended for three original Centers
- July-Dec. 2009--Three original 2010 Research Centers reported \$27.2 million in research awards received by centers.
- Five spin off companies
- Two business expanded to South Dakota to collaborate with 2010 Research Centers.



External Evaluation of Program

"The vision to require that the 2010 Centers drive toward sustainability, build collaborations among universities and the private sector, increase competitiveness for federal funding programs, support academic programs with a focus on graduate training, and drive economic development, created a challenging framework. If successful within such a framework the 2010 Centers would truly have a positive impact on the state. We report that with few exceptions, the Centers have been successful and have had a positive impact on the state."

(Report of the AAAS Research Competitiveness Program Review Team, December 2007)



South Dakota's R&D Growth Leads the Nation

South Dakota's R&D Statistics and Rankings (Source NSF)

1

FY 02-06 113% increase in federal
R&D obligations per capita

FY 02-06 77% increase in federal
S&E obligations to academia

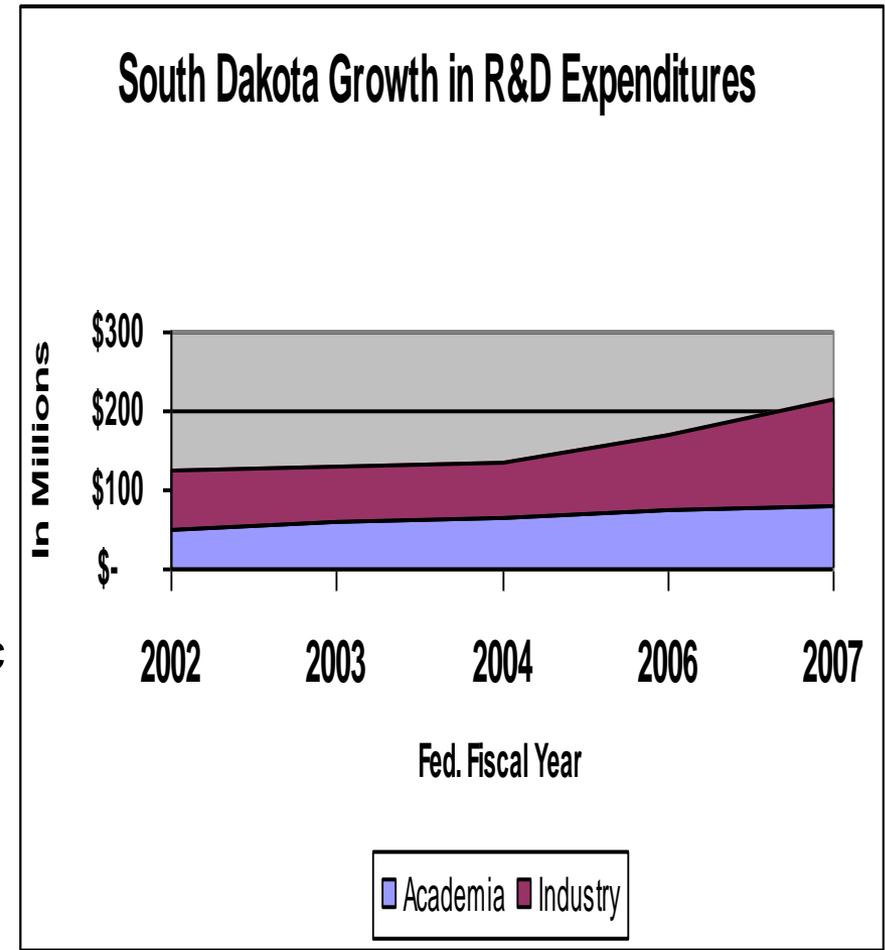
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FY 03-07 195% increase in
academic R&D funding from
industry

FY 03-07 63% increase in academic
federal R&D expenditures

4

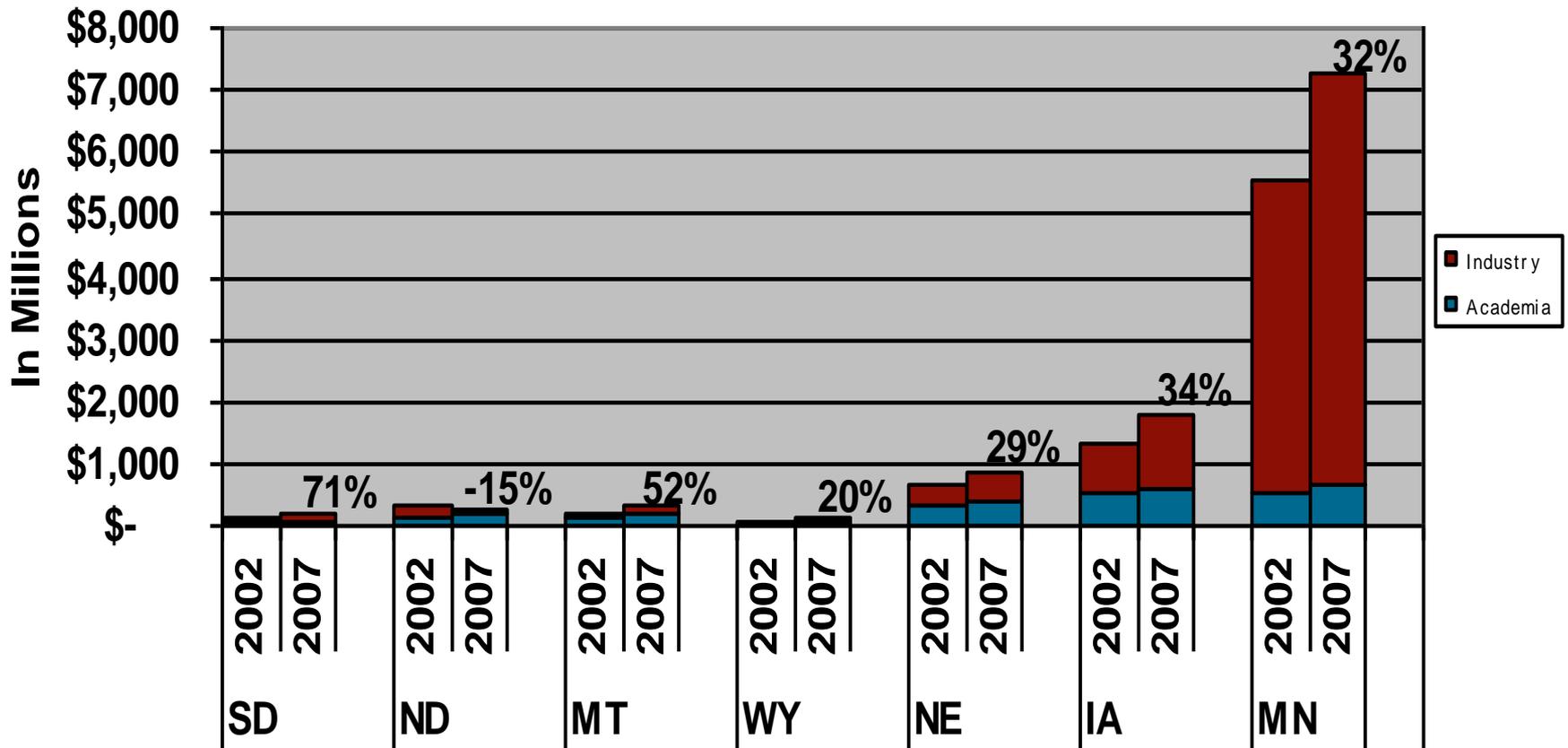
FY 03-07 76% increase in industry
R&D spending



South Dakota's Percentage R&D Growth Leads the Region

R&D Expenditures and Change from FY 2003-2007

Source: National Science Foundation 2009



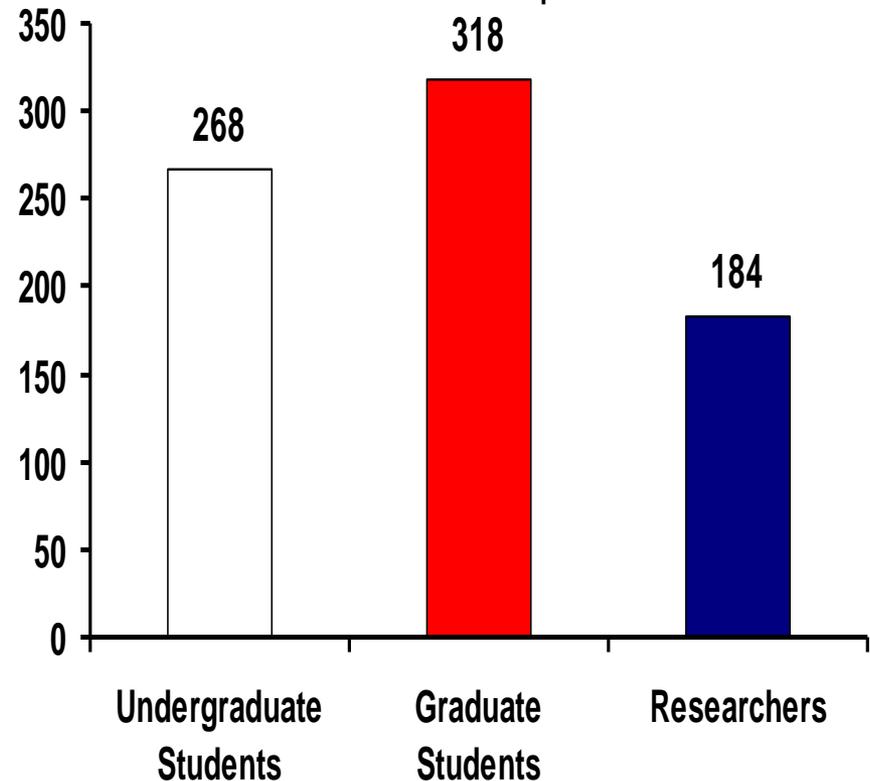
Impact of 2010 Research Center Investments

2010 Research Centers report supporting 770 people since 2005

- 268 Undergraduates
- 318 Graduate Students
- 184 Researchers

People Supported by Center Activities
(FY05-FY10)

Source: 2010 Center Reports

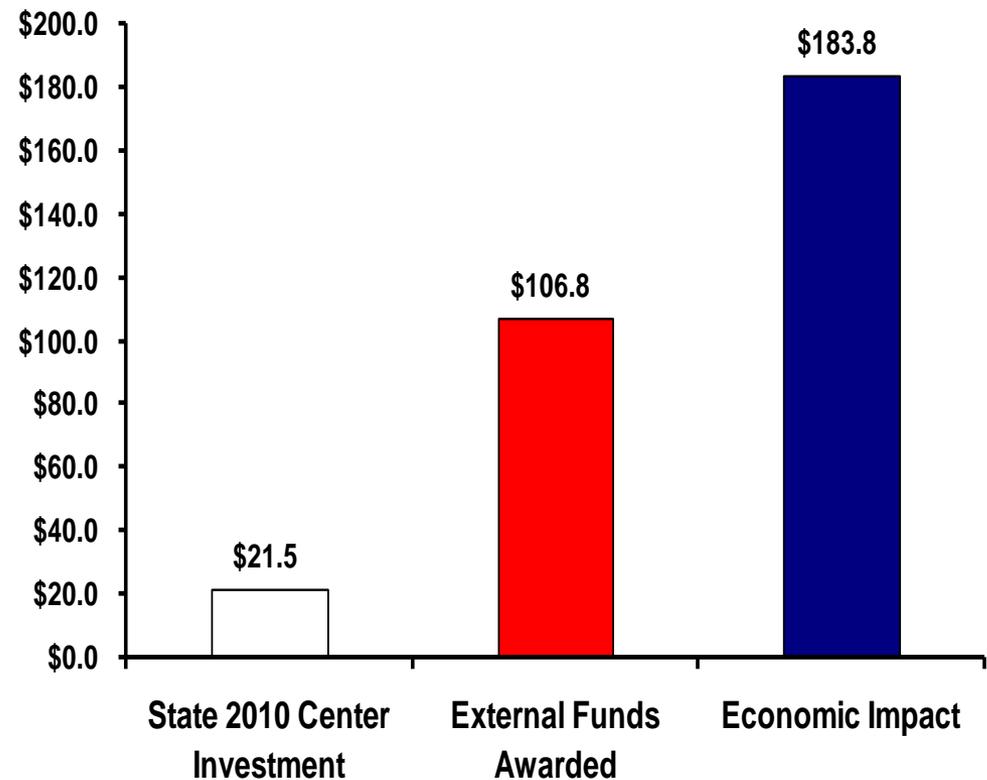


Impact of 2010 Research Center Investments

- South Dakota has invested \$21.5 million in 2010 Research Centers
- The Centers report having received \$106.8 million from other sources
- A conservative Economic Impact Model yields \$183.8 million in economic impact to the State of South Dakota

2010 Centers' Economic Impact FY05-FY10 Investment and Return

Source: 2010 Center Reports

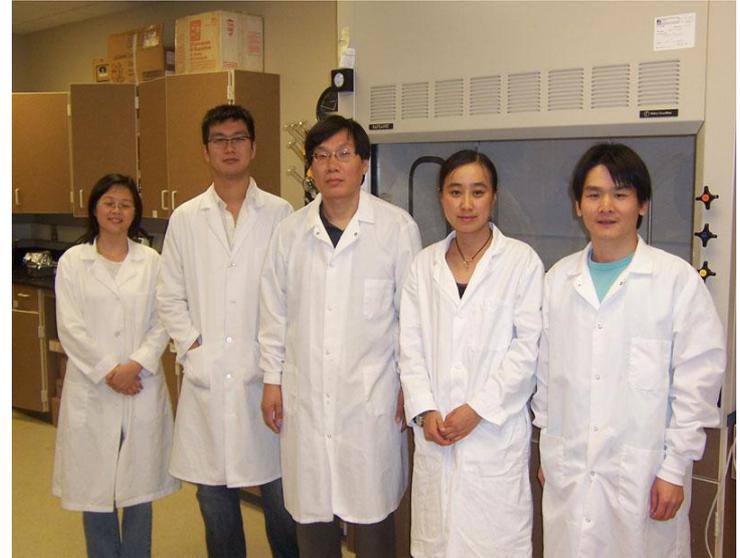


(in millions of dollars)



South Dakota Synergistic Research Investments

- 10 New Ph.D. programs since 2005 (28 total)
 - Proposed Ph.D. in Physics would bring new Ph.D. programs to 31
 - Goal: Double number of Ph.D. Programs to 36 by 2010
 - 551 Ph.D. students enrolled in fall 2009
- SEED grants
 - \$500,000 total annually
 - 66 faculty awards to date
- Dr. Yuyu Sun, Biomedical Engineering faculty member brought NIH funding & research to South Dakota in August 2008



Dr. Sun & Antimicrobial Research team

Infection-fighting polymer technology licensed to ATG, a SD small business pursuing commercialization



CNN Top 10 Health Innovation of 2009: Antimicrobial Paint Developed at USD

- Associate Professor Yuyu Sun and Research Associate Zhengbing Cao, Biomedical Engineering Program.
- Initial research with Kevlar, created to protect people from exposure to biochemical hazards; Dr. Sun developed a germ-killing molecule that can be added to cloth and Kevlar to create antimicrobial properties. Example: athletic socks.
- N-halamine, a potent germ-fighting substance, also can be added to paint to help hospitals fight infectious “superbugs.”
- Patent-pending technology was licensed to Antimicrobial Technologies Group, a South Dakota start-up company that will roll out a line of antimicrobial products this year.

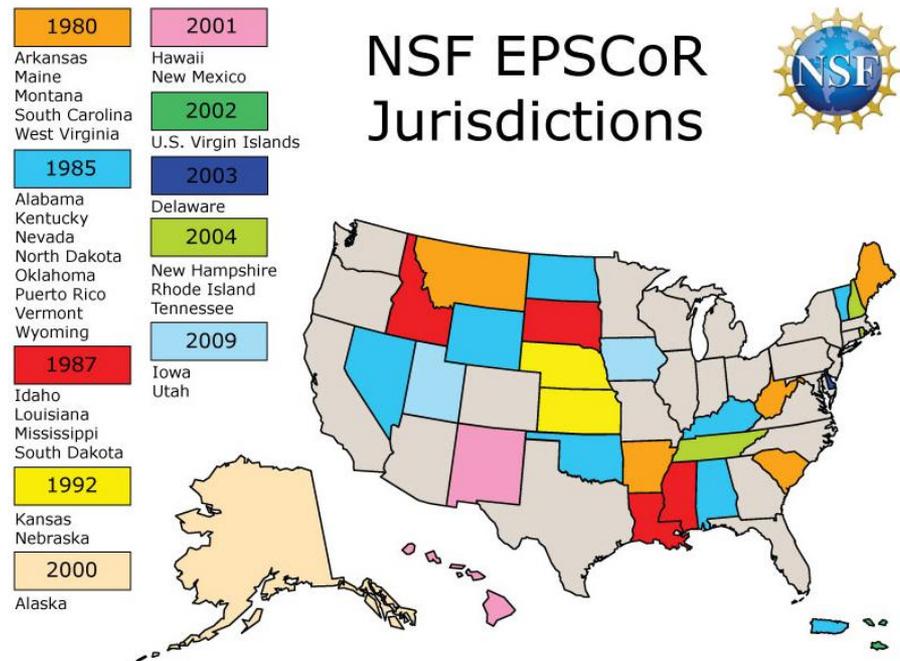


EPSCoR Programs

Support Research Infrastructure

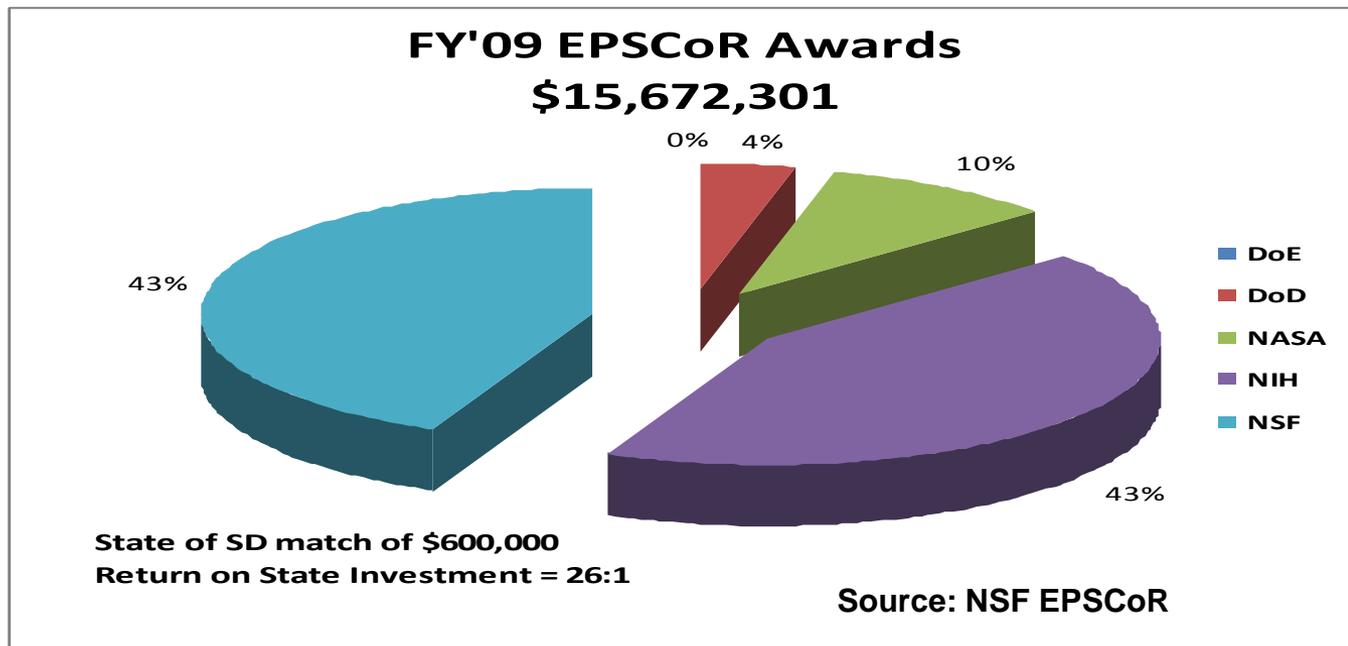
Six Federal Agencies Participate

- Fund research infrastructure
 - Equipment
 - Education & Outreach
 - Economic Development
- Research Projects



SD EPSCoR Programs

- \$600,000 state match
- 26 : 1 return on state investment
- SD EPSCoR Advisory Committee (REACH) oversees state programs
- South Dakota receives EPSCoR funding from six federal agencies



NSF EPSCoR RII: Statewide Project

NSF EPSCoR RII

- 2006-2009 \$7.3 million project completed
- 2009-2014 \$24 million project
 - \$20 million NSF funds
 - \$4.2 million match required
 - State (\$600,000)
 - Private
 - Universities
 - Equipment
 - Young researchers
 - Graduate students
 - Undergraduate students
 - Materials & supplies

South Dakota Organizations Involved in EPSCoR

- SD Departments of Education and Tourism and State Development
- South Dakota State University
- University of South Dakota
- South Dakota School of Mines & Technology
- Black Hills State University
- Dakota State University
- Augustana College
- Dakota Wesleyan University
- Mount Marty College
- University of Sioux Falls
- Sinte Gleska University
- Oglala Lakota College
- Sisseton Wahpeton College

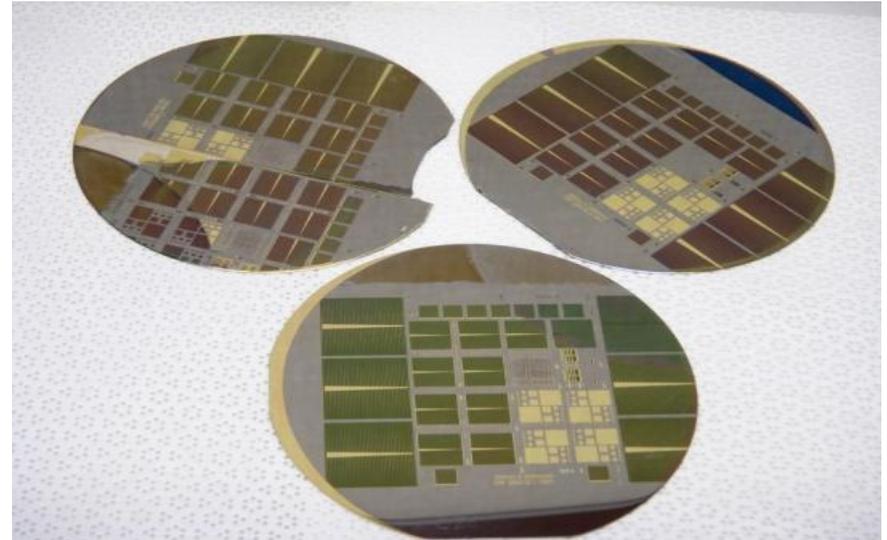


2010 Research Center Economic Development: Recruitment

- Radiance Technologies Inc.
 - Electronic manufacturing facility (AERI) in Mission-20 employees
 - DoD Alternative Power Technologies Program--\$7.2 million SDSU/Radiance Technologies-8 employees in Brookings
 - Research Collaboration with SDSM&T-2 students



AERI Facility in Mission



Solar Cells Developed at SDSU



2010 Research Center Economic Development: Entrepreneurs

- PhotoBioMed (Giant Vision Winner 2006)
- Prairie Scientific (Giant Vision Second Place 2008)
- Tetherx Inc.
- Antimicrobial Technologies Group (ATG)
- PNST Inc.
- Secure Banking Solutions

Source: 2010 Center Reports



2010 Research Center Economic Development: Expansion



79 Companies

- 151 Internships/Assistantships
- 35% of interns/assistants employed full-time by company after graduation
- 1:1 match required
- Companies have paid \$2.50 for each \$1 Dakota Seeds received

Source: GOED- Survey of Participating Businesses



2010 Research Centers Currently Receiving State Support

2007

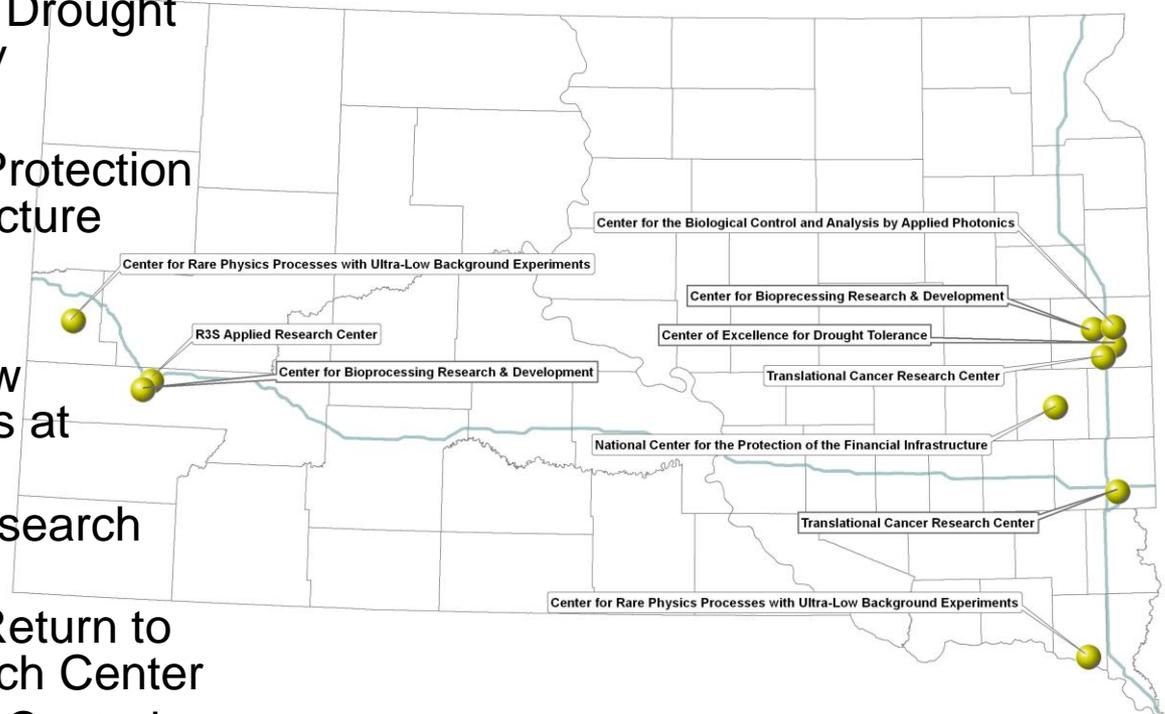
- Center for Bioprocessing Research and Development
- Center of Excellence for Drought Tolerance Biotechnology

2008

- National Center for the Protection of the Financial Infrastructure

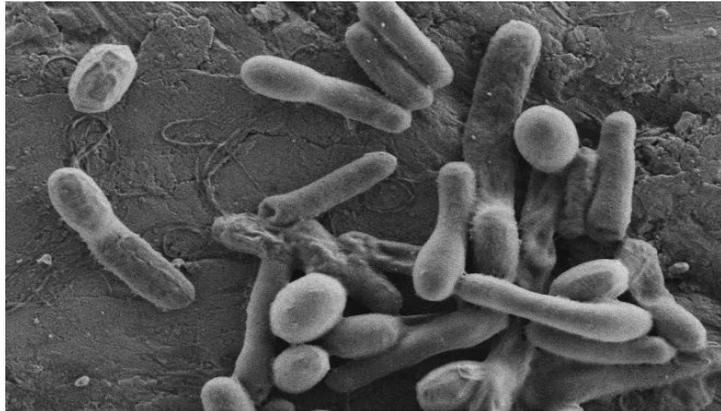
2009

- Center for Rare Physics Processes with Ultra-Low Background Experiments at Sanford Lab/DUSEL
- Translational Cancer Research Center
- Repair, Refurbish, and Return to Service: Applied Research Center
- Center for the Biological Control and Analysis by Applied Photonics



Center for Bioprocessing Research and Development

- Collaboration
 - South Dakota School of Mines & Technology
 - South Dakota State University
 - 28 researchers from 8 departments, 6 post-docs, 30 students
- \$2.5 million 2010 Center Funding (FY 2007-2012)
 - \$9.7 million external funding
 - 5:1 return on state investment
 - 5 Invention Disclosures
 - NSF University Industry Research Center award
 - 5 university partners
 - 25 industry partners
 - \$1 million membership dues



Cellulose-degrading thermophiles isolated from DUSEL



Center for Bioprocessing Research and Development

- Accomplishments
 - FY 2010 Department of Defense Funding
 - SDSU: \$807,000 from Army Research Laboratory (renewable jet fuels)
 - 4 faculty, 2 post-docs, 3 PhDs
 - Infrastructure: Pyrolysis pilot plant
 - Equipment: \$0.5 million
 - SDSM&T: \$1 million from Air Force Research Laboratory (biofuels)
 - 1 faculty, 1 post-doc, 1 PhD
 - Infrastructure: \$0.175 million (500 sq ft lab space)
 - Equipment: \$0.22 million
 - Collaboration with K&L Energy Inc.
 - SDSM&T: Hydrolysis, Fermentation, Product Development
 - SDSU: Pretreatment



Center of Excellence for Drought Tolerance Biotechnology

- South Dakota State University
- 2008 - \$2.9 million state funds over three years
- South Dakota Seed Industry Partner
- \$6.2 million Seed Technology Center
- Funds 2009
 - 2010 program: no new funds
 - \$3.4 million federal
 - \$1.1 million private
- Future plans
 - Funding: experiment station and
 - commodity groups, industry, and federal grants



Seed Technology Building



Center of Excellence for Drought Tolerance Biotechnology

- The center is creating teams needed to increase South Dakota's agricultural production.
 - Speed up the delivery of new genetics and management practices that will increase yields in water limited environments.
 - A drought tolerant corn hybrid that produces a 5 bu/acre yield increase that is planted on 2 million acres will increase SD wealth by 35 million dollars.
 - Provide an environment for excellence in agricultural research.
 - Agriculture is critical for South Dakota economic future. This program has provided funds needed to integrate applied and basic research programs.
 - The center has made the investment needed for long-term economic returns.



National Center for the Protection of the Financial Infrastructure

- Collaborators
 - SD Bankers Association
 - Federal Reserve Bank
 - Dept. of Homeland Security
- FY 2009-2013 - \$2 million
- \$250,000 in external funding
- Business Expansions
 - Secure Banking Solutions
 - 16 FT jobs, 7 PT jobs, hiring a President, raising investment dollars to grow further, SBIR funding



National Center for the Protection of the Financial Infrastructure

- Grant Productivity
 - Not yet announced: NSF REU \$300,000
 - Grants pending: 9 grants totaling \$5.893 million
- Department of Homeland Security
 - Dakota State is the lead university to define and operationalize a critical infrastructure protection consortium
 - Partner institutions include: University of Illinois and Dartmouth
 - DHS holds the potential for significant sustained funding
 - Awarded a small planning grant (\$50,000)



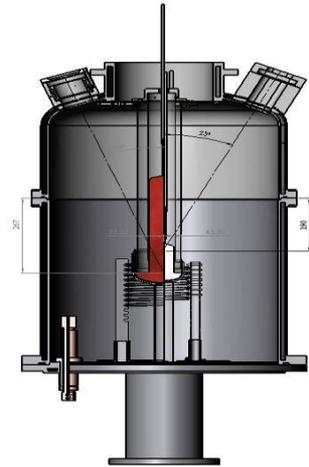
Center for Rare Physics Processes with Ultra-Low Background Experiments at Sanford Lab/DUSEL

- Connects SD to high priority research
 - Partners with Lawrence Berkeley and Los Alamos National Labs
 - Positioned to be part of NSF DUSEL
- Fosters statewide collaborations
 - Sanford Underground Laboratory
 - SD colleges & universities: USD, SDSU, SDSMT, BHSU, DSU, Augustana
- FY 2009-2014 \$3.4 million
- \$7.5M grants/contracts proposed
- \$650,000 external funding in 2009
- Supports 18 SD students
- 9 papers and 12 presentations made.



Center for Rare Physics Processes with Ultra-Low Background Experiments at Sanford Lab/DUSEL

- Materials, processes for DUSEL and commercial uses
 - Crystal growth underground
 - Electroforming copper underground
 - Low background counting
 - Depleted argon production
- Essential studies in energy research and basic sciences
 - Dark Matter/Double-beta decay experiments



Translational Cancer Research Center

- **Collaboration**
 - **South Dakota State University**
 - **Sanford Research**
- **FY 2009-2014 \$2.3 million**
- **\$3 million external funding**
- **4 Invention disclosures, 1 international patent filed**
- **Two spin off & collaborating companies**



www.sanfordhealth.org

ACHIEVING NATIONAL DISTINCTION,
STRENGTHENING LOCAL RELEVANCE

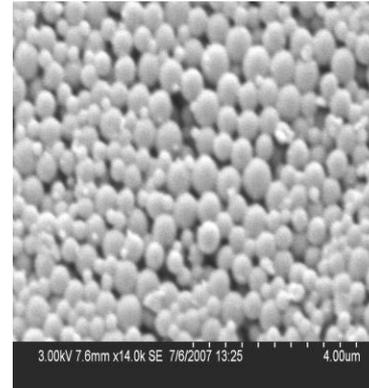


Translational Cancer Research Center

- **Zein, a corn protein-based nanoparticulate platform technology was developed**
- **Brookings based start-up company Protein Nanoparticle Science and Technology (PNST) LLC formed**
- **Zein nanoparticulate technology licensed to PNST for Commercialization**
- **Revenue: \$109,750**
- **NIH COBRE Application (>\$2million; fundable score)**



Corn

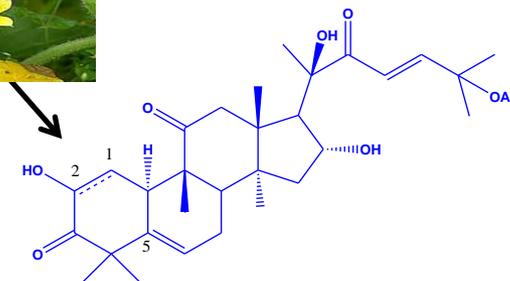


**Zein
Nanoparticles**



Center for the Biological Control and Analysis by Applied Photonics (BCAAP)

- Collaboration
 - South Dakota State University
 - Avera Research Institute
- FY 2009-2014 \$4.3 million
- \$1.4 million external funding
- 7 Invention disclosures
- Spin off & collaborating companies
 - Tetherx
 - PhotoBioMed
 - Natpro
- Future Plans - Access to biological systems at an unprecedented scale (single molecules) will be leveraged to national recognition in three steps:
 - Build up Infrastructure for **Basic Sciences**
 - Advance intellectual property through patent to a product, **Translational Research**
 - Build our research and training capacity to successfully compete for federal grants to provide **Long Term Sustainability**



Center for the Biological Control and Analysis by Applied Photonics (BCAAP)

Major accomplishments of BCAAP 2010

- Filled a tenure track position with a nationally competitive hire complementary to the center focus, John Robinson, MD, PhD
- Acquired fundamental research equipment
- Strengthened our partnership with individual Avera researchers
- Spin off, collaborating companies and partners have contributed \$650,689 in research and development funds
- Spin off company, Tetherx, is fundraising to move SD created technology to First in Man trials, a major step towards market approval
- Initiated discussions of technology transfer to another South Dakota Company



Repair, Refurbish and Return to Service (R3S) Applied Research Center

- Collaboration
 - SD School of Mines & Technology
 - South Dakota State University
 - Western Dakota Technical Institute

- FY 2009-2014 \$2.2 million
- \$4.7 million external funding

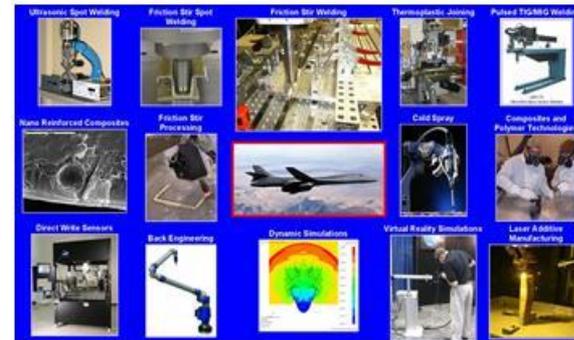
- Collaborating companies
 - H. F. Webster
 - RPM
 - General Atomics

SD Governor's 2010 Applied Research Center (ARC)



SDSMT Materials Technology Portfolio

- Ellsworth AFB
- Army Research Laboratory (ARL)
- Army R&D Engineering Center (ARDEC)
- ONR Navy Joining Center (ONR/NJC)



- SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY
- UNIVERSITY OF SOUTH CAROLINA
- THE BRIGHAM YOUNG UNIVERSITY
- MISSOURI S&T UNIVERSITY
- WICHITA STATE UNIVERSITY



Repair, Refurbish and Return to Service (R3S) Applied Research Center

Major Accomplishments

- **Business development**
 - ONR/NJC Navy Life Extension Program (\$2.5M) was awarded
 - Proposal has been awarded from NSF for the continuation of R3S ARC CFSP partnership (\$0.5M) for the Next five years
 - HF Webster-MTS alliance agreement for producing low cost FSW equipment in South Dakota
- **Research partnerships**
 - Federal labs: ARL, ONR/NJC, LANL, AFRL, ARDEC, ORNL, DARPA, PNNL
 - Universities: USC, BYU, MST, WSU, OSU, UAH
 - Commercial Partnerships: MTS, Cummins, Sikorsky, Boeing, and AIMEN Centro (Spain)
 - International: University of Strathclyde , UK
- **Five components repaired to date**
 - Projected revenue ~\$100,000
- **R3S research scientist hired**
 - The position of R3S Research Scientist has been filled with the hiring of Dr. Bharat Jasthi (Research Scientist II)



Summary & Questions

- Three original 2010 Research Centers are self sustaining and growing after state support ended.
- One original Center closed early.
- Seven current Centers are having good success in obtaining external funding and private sector collaborations.

Questions

