INTEGRATIVE ACTIVITIES $276,000,000

The FY 2009 Budget Request for Integrative Activities (IA) is $276.0 million, an increase of $43.73 million, or 18.8 percent, above the FY 2008 Estimate of $232.27 million.

Integrative Activities Funding
(Dollars in Millions)

	FY 2007 Actual	FY 2008 Estimate	FY 2009 Request	Change over FY 2008 Estimate Amount	Percent
Integrative Activities[1]	$219.45	$232.27	$276.00	$43.73	18.8%
EPSCoR	*102.11*	*111.10*	*113.50*	*2.40*	*2.2%*

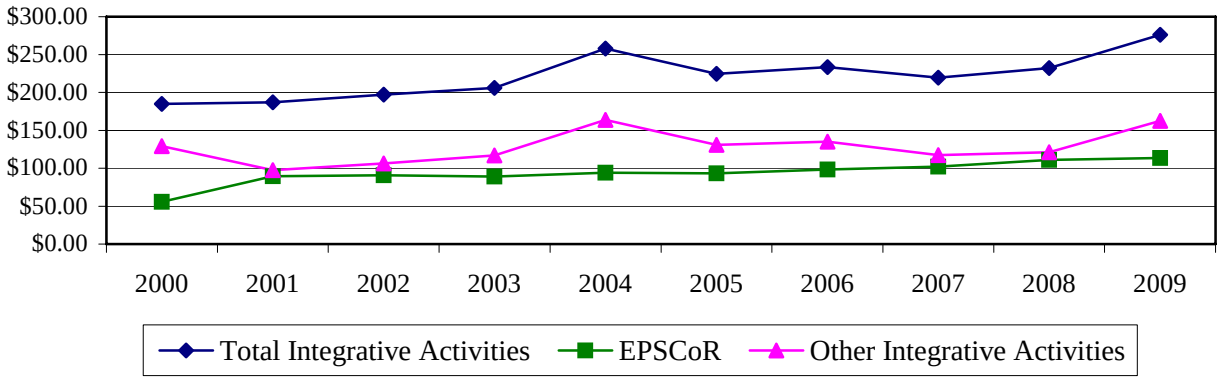
[1] Funding for EPSCoR is shown for all years for comparability. EPSCoR was transferred from the Education and Human Resources appropriation to the Research and Related Activities appropriation in FY 2008.

RELEVANCE

Integrative Activities supports emerging, cross-disciplinary research and education, recognizing the importance of integrative efforts to the future of science and engineering. IA is a source of federal funding for the acquisition and development of research instrumentation at U.S. academic institutions and for strengthening the research and educational infrastructure throughout the Nation. Also supported are a number of integrative research and education centers and programs that enhance NSF research investments in discovery and workforce development.

Funds appropriated to IA are managed by a variety of organizations within NSF, which provides the flexibility to broaden support for emerging, cross-disciplinary research programs and activities. For example, the Science and Technology Centers program currently funds 17 centers that are managed cooperatively by six NSF directorates/offices and the Office of Integrative Activities. EPSCoR maximizes cross-directorate interaction and ensures the integration of its efforts with the research and education directorates.

Integrative Activities Funding
(Dollars in Millions)



Integrative Activities Funding by Program

(Dollars in Millions)

	FY 2007 Actual	FY 2008 Estimate	FY 2009 Request	Change over FY 2008 Estimate Amount	Percent
Communicating Science Broadly[1]	*[$3.80]*	*[$4.00]*	$4.00	$4.00	N/A
EPSCoR[2]	102.11	111.10	113.50	2.40	2.2%
Major Research Instrumentation	90.00	93.90	115.00	21.10	22.5%
Partnerships for Innovation	9.19	9.19	9.56	0.37	4.0%
Science & Technology Centers	1.19	0.90	15.90	15.00	1666.7%
Science & Tech. Policy Institute[3]	4.32	2.24	3.04	0.80	35.7%
Science of Learning Centers	12.64	14.94	15.00	0.06	0.4%
Total, Integrative Activities	$219.45	$232.27	$276.00	$43.73	18.8%

Totals may not add due to rounding.

[1] Communicating Science Broadly is presented in FY 2007 and FY 2008 for information purposes only and is not included in totals for these years or in change amounts or percents for any years. This effort was funded through Research and Related Activities Program

[2] Funding for EPSCoR is shown for all years for comparability. EPSCoR was transferred from the Education and Human Resources appropriation to the Research and Related Activities appropriation in FY 2008.

[3] Funding for the Research and Development in the US (RaDiUS) database is reflected in FY 2007 Actuals and FY 2008 Estimate.

Summary of Major Changes in Agency-Wide Investments ***(Dollars in Millions)***

FY 2008 Estimate, IA.....……....$232.27

Discovery

Experimental Program to Stimulate Competitive Research (EPSCoR) +$2.40

With an increase of $2.40 million over the FY 2008 Estimate, funding for EPSCoR will total $113.50 million. This increase will provide $2.0 million for Research Infrastructure Improvement (RII) for multi-jurisdictional cyberinfrastructure (new RII Track 2 awards) and $400,000 for workshop-based outreach activities that build jurisdictional and regional research capacity. Co-funding will be supported at the level of the FY 2008 Estimate. At the FY 2009 Request, EPSCoR investment priorities are: 1) improved competitiveness of EPSCoR jurisdictions in disciplinary and multidisciplinary research programs across NSF, including large scale and cross-cutting competitions; 2) strengthened cyberinfrastructure critical to advances in research and education in all EPSCoR jurisdictions; and 3) increased diversity that is essential to greater use of the human and institutional resources in EPSCoR jurisdictions. To maintain the rich synergy among EPSCoR and research and education directorates and offices, the FY 2008 Estimate for EPSCoR is $111.10 million. This proposed allocation includes a 1.1 percent increase over the FY 2007 current plan plus $8.0 million.

Science and Technology Centers: Integrative Partnerships (STC) +$15.00

FY 2009 funding of $15.9 million will support a new STC competition in which five to seven new STCs are expected to be named. At the same time, five centers established in FY 2000 will be in their tenth and final year of NSF support.

The Science and Technology Centers: Integrative Partnerships program advances discovery and innovation in science and engineering through the integration of cutting-edge research, excellence in education, targeted knowledge transfer, and the development of a diverse workforce while broadly advancing the goals and objectives of the Administration's American Competitiveness Initiative (ACI) and the America COMPETES Act. The STC research portfolio reflects the disciplines of science and engineering supported by NSF. Examples of continuing investment include cyber-security, advanced nano/microfabrication capabilities, new materials and technologies for monitoring water resources and water quality, medical devices, modeling and simulation of complex earth environments for improving their sustainability, and weather/climate prediction.

STCs engage the Nation's intellectual talent and robustly draw from its full human diversity through partnerships among academia, industry, national laboratories, and government. These partnerships create synergies that enhance innovation and ensure the timely transfer of knowledge and technology from the laboratory to appropriate industries, the application of patents derived from the work of the STCs, the launching of spin-off companies, and creation of job opportunities. Furthermore, STCs have impressive records of publications and research training of American undergraduate students, graduate students, postdoctoral fellows, established researchers, and educators as well as contributions to K-12 education, industry, and other sectors.

Science of Learning Centers (SLC) +$0.06

With an increase of $60,000 over the FY 2008 Estimate, funding for the SLC program will total $15.0 million. These funds provide continuing support for the second cohort of Science of Learning Centers and for programmatic activities, including workshops, Small Grants for Exploratory Research (SGERs), supplements for program infrastructure and development, and administration. The first cohort of SLCs were fully funded in earlier years. SLCs are built around a unifying research focus on science of learning and incorporate a diverse, multidisciplinary environment involving appropriate partnerships with academia, industry, international partners, all levels of education, and other public and private entities.

<u>Learning</u>

Communicating Science Broadly +$4.00

The Request of $4.0 million supports a range of program activities encompassing internet technology, visualization, cable TV, radio, the entertainment industry, public awareness campaigns, and new outreach efforts, including new partnerships with research institutions, state and local governments, and businesses.

A leading-edge, 21st century communications effort is essential for public acceptance and support of science and engineering. "Traditional media" – the once-major television networks, newspapers, and magazines – have given way to countless internet news sites, web logs (or blogs), personal-device downloads, wireless transmissions, and the like, competing among a population that has become highly pluralized in not only its want for information and how (and when) it receives it, but also in its cultural demographics. In today's technological culture, opportunities for learning abound in both community and personal settings. The new Office of Legislative and Public Affairs effort, "Communicating Science Broadly Through Multi-media Platforms", will create products and processes that make learning and understanding science, technology, engineering, and mathematics part of everyday life.

Partnerships for Innovation (PFI) +$0.37

With an increase of $370,000 over the FY 2008 Estimate, funding for PFI will total $9.56 million. This will fund one additional award over expected FY 2008 awards, for a total of 12 to 16 awards in FY 2009. The PFI program connects knowledge created in the discovery process to learning and innovation. Goals are to: 1) stimulate knowledge transformation created by the national research and education enterprise into innovations that create new wealth, build strong economies, and improve the national well-being; 2) broaden participation to more fully meet the range of workforce needs of the national innovation enterprise; and 3) enhance enabling infrastructure necessary to foster and sustain innovation in the long-term. In these ways, the PFI program directly addresses key objectives of the American Competitiveness Initiative and the America COMPETES Act. Partnerships must include a U.S. academic institution as lead and a private sector partner; state/local government partnerships are also encouraged.

Research Infrastructure

Major Research Instrumentation (MRI) +$21.10

With an increase of $21.10 million, or 22.5 percent, over the FY 2008 Estimate, funding for MRI will total $115.00 million. This increase allows enhanced support for the acquisition and development of mid-size instruments as recommended by the National Academy of Sciences. During FY 2009 the MRI funding cap will remain at $4.0 million for single instrument acquisition requests submitted by eligible institutions.

Scientific advances in many fields are critically dependent on the development and acquisition of sophisticated instrumentation. MRI is a Foundation-wide, crosscutting program that supports the acquisition and development of instrumentation relating to a number of specific goals and objectives in the ACI, including nanotechnology and nanoscience, computing, the physical sciences, and materials science and engineering. Funding provides for a diverse portfolio of projects that emphasize state-of-the-art instrumentation, access, and training to support modern research approaches, cross-disciplinary research, integration of research and education, public/private partnerships, and assistance to small and minority-serving institutions. Funding also provides for the acquisition and development of state-of-the-art instrumentation that is too costly to be supported through core NSF programs. It promotes partnerships between academic researchers and private sector instrument developers. Approximately $20.0 million supports teaching-intensive and minority-serving institutions, including Historically Black Colleges and Universities, Hispanic-Serving Institutions, Tribal Colleges, and community colleges, with a focus on research training. Cost sharing provisions in the FY 2009 MRI competition will continue to reflect requirements defined by the America COMPETES Act of 2007 and will continue to require cost sharing for Ph.D. granting educational institutions.

In the FY 2007 MRI competition, NSF received 774 proposals and funded 221 for a total of $89.36 million. Minority-serving institutions received 36 awards totaling $11.66 million. Non-Ph.D. granting institutions received 87 awards totaling $21.1 million. Approximately 235 competitive awards are anticipated in FY 2009.

Science and Technology Policy Institute (STPI) +$0.80

In support of the Office of Science and Technology Policy request for the Science and Technology Institute, and consistent with the STPI authorizing statue, NSF sponsors the STPI contract. For this purpose, NSF's FY 2009 Budget Request provides $3.04 million for STPI.

This is a 35.7 percent increase over the FY 2008 Estimate of $2.24 million. The increase returns STPI to recent funding levels and ensures support for technical and analytic assistance for the development of science and technology policy and effective coordination of the federal R&D enterprise.

Subtotal, Changes +$43.73

FY 2009 Request, IA .....…….....… $276.00

QUALITY

NSF uses various internal and external mechanisms to ensure the quality and relevance of existing and proposed programs and to help identify new and emerging opportunities that support agency-specific goals. These mechanisms include merit-based review of proposals, Committees of Visitors (COVs) program oversight, advisory committees and other expert panels, National Academies and other reports, workshops, and long-range planning documents.

NSF maximizes the quality of the R&D supported through the use of a competitive, merit-based process. To ensure the highest quality in processing and recommending proposals, NSF convenes COVs, composed of qualified external evaluators, to review each program. These experts assess the integrity and efficiency of proposal review processes and provide a retrospective assessment of the quality of results of NSF's investments. Several programs conduct annual reviews and undergo reviews and assessments of program outcomes via external contractors.

The STC program maintains a variety of ongoing practices that ensures the quality and relevance of program-supported activities during the 10-year duration of each Center. These practices include strategic planning; annual review by an external team of expert site visitors; fourth-year, in-depth competitive review of renewal proposals; peer review of the program and program outcomes, training of NSF technical coordinators; and shared governance between research directorates and the Office of Integrative Activities. Each Center is required to submit an annual report that has a format specifically designed for the program, participate in annual workshops developed for Center directors and the center education network, provide ethics training for Center staff and participants, and maintain and convene annually an external advisory board that provides guidance, advice, and oversight. Each Center submits a list of advisory board members and their affiliations to NSF and the list is reviewed for conflicts of interest. Additionally, STCs have teleconferencing capabilities to maintain communication within the Center and with NSF.

MRI proposal actions are reviewed on a three-year basis by Committees of Visitors (COVs) in the directorates and divisions managing award grants. In addition to these reviews, the program convenes a COV to conduct an overall evaluation of the program every five years. In FY 2005, the MRI program convened a COV during which the external evaluators examined overall program management and processes, proposal actions, and the results of NSF investments from FY 2000 to FY 2004. The COV commended the program for enhancing the research capacity of the science and engineering community. The next overall evaluation of the MRI program will take place in 2010.

The Foundation-wide EPSCoR program ensures quality and relevance in its Research Infrastructure Improvement (RII) grant element through required strategic planning by participants and through biennial performance effectiveness reviews of awards that complement annual reports and COV processes. In its co-funding element, quality, relevance, and transparency are ensured through merit

review in cognizant NSF research and education directorates and their subsequent triennial COV processes. In FY 2005 EPSCoR convened a COV during which the panel of external evaluators examined overall program management and processes, proposal actions, and the results of NSF investments from FY 2000 to FY 2004. The COV commended the program for the new directions and innovations initiated by the EPSCoR Office and for increasing the capacity of the program to evaluate and measure program outputs and outcomes. Due to the relocation of EPSCoR to the Office of Integrative Activities in the Office of the Director from the Directorate for Education and Human Resources in FY 2008, the next COV was re-scheduled and will take place in FY 2009.

EXPERIMENTAL PROGRAM TO STIMULATE COMPETITIVE RESEARCH — $113,500,000

The FY 2009 Budget Request for the Experimental Program to Stimulate Competitive Research (EPSCoR) is $113.50 million, an increase of $2.40 million, or 2.2 percent, over the FY 2008 Estimate of $111.10 million.

Experimental Program to Stimulate Competitive Research Funding
(Dollars in Millions)

	FY 2007 Actual	FY 2008 Estimate	FY 2009 Request	Change over FY 2008 Estimate Amount	Percent
EPSCoR Funding[1]	$102.11	$111.10	$113.50	$2.40	2.2%

[1] Funding for EPSCoR is shown for all years for comparability. EPSCoR was transferred from the Education and Human Resources appropriation to the Research and Related Activities appropriation in FY 2008.

About EPSCoR:

EPSCoR's mission is to assist the Foundation in its statutory function to strengthen research and education throughout the United States and to avoid undue concentration of such research and education. The primary goals of EPSCoR are: (1) to stimulate sustainable improvements in the R&D capacity and competitiveness within the major research universities of the designated EPSCoR jurisdictions, and (2) to advance scientific and engineering capabilities in these jurisdictions for discovery, innovation, and overall knowledge-based prosperity. NSF EPSCoR currently operates in 25 states – Alabama, Alaska, Arkansas, Delaware, Hawaii, Idaho, Kansas, Kentucky, Louisiana, Maine, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Mexico, North Dakota, Oklahoma, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, West Virginia, and Wyoming – and in the Commonwealth of Puerto Rico and the Territory of the Virgin Islands.

EPSCoR goals and objectives are strongly aligned with major actions recommended recently by the National Academies' Committee on Prospering in the Global Economy of the 21st Century. Programmatic objectives are designed to stimulate further scientific and engineering prowess in the 27 EPSCoR jurisdictions. These jurisdictions have significant unused potential for contributing to the Nation's technology-based discovery, innovation, and productivity.

Approximately 27 percent of the funds requested will be available for new research grants. New funds will also support workshops and other outreach and capacity building activities. The remainder will go to continuing commitments made in previous years.

To pursue its goals and objectives, EPSCoR will employ a portfolio of three complementary strategies:

Research Infrastructure Improvement (RII) Grants – With an increase of $2.0 million over the FY 2008 Estimate, funding for RII will total $76.0 million. Research Infrastructure Improvement Grants are of two types. ***RII Track 1*** grants are awards of up to $15.0 million for up to 60 months, made to individual jurisdictions, to support infrastructure improvements in areas selected by the jurisdiction's EPSCoR governing committee as having the best potential to improve future research and development competitiveness. ***RII Track 2*** grants are awards of up to $2.0 million for up to 36 months, made to consortia of EPSCoR jurisdictions, to support innovation-enabling cyberinfrastructure of regional, thematic, or technological importance. Successful RII awards will build the core strength and capacity

needed to develop both independent and collaborative methods for the solution of research and education problems having regional and national import. Activities supported through RII awards are expected to facilitate knowledge generation leading to economic development and to promote development of a diverse, well-prepared, internationally competent, and globally engaged STEM workforce necessary to sustain the Nation's competitive edge. These grants will enhance discovery and learning through use of cyber-infrastructure and other technologies, expand the scientific literacy of all citizens, and disseminate to them the importance of STEM research and education. The $2.0 million increase will support new RII Track II awards.

Co-Funding – Co-funding in FY 2009 will remain at the FY 2008 Estimate level of $36.0 million. Sustainable research competitiveness of EPSCoR jurisdictions across the Foundation requires increased funding of individual and group proposals in all NSF directorates and offices. To facilitate this, joint support may be provided for proposals that have been submitted directly to the NSF research and education directorates and offices, merit reviewed, and recommended for funding. Co-funding enables the EPSCoR program to collaboratively support cutting-edge research and education projects that have competed successfully through the merit review process within regular NSF programs and initiatives that would not otherwise be supported because of limited resources. This mechanism allows EPSCoR to build capacity at the research frontier in EPSCoR jurisdictions and to leverage its resources to more broadly integrate EPSCoR investigators and institutions into all Foundation programs.

Outreach – With an increase of $400,000 million over the FY 2008 Estimate, funding for Outreach activities will total $1.50 million. Financial support is provided for outreach visits by NSF staff to inform the EPSCoR research community about NSF priorities, programs, and policies and to more fully acquaint NSF staff from all directorates and offices with the research and development resources and potential residing within EPSCoR jurisdictions. The increase will support up to eight workshops that build jurisdictional and regional capacity in areas aligned with R&D activities selected by EPSCoR jurisdictions and NSF priority areas. Frequently, these outreach activities are workshop-based and, in all cases, build jurisdictional and regional capacity in essential dimensions of research competitiveness aligned with both state and NSF objectives.

Changes from FY 2008:

In FY 2009, the EPSCoR program expects to provide $76.0 million to fund a combination of new and continuing RII Track 1 and new RII Track 2 awards. This represents an increase of $2.0 million over the FY 2008 estimate and continues an ongoing commitment to ACI goals. Co-funding will be supported at the FY 2008 level of $36.0 million. Approximately $1.50 million, an increase of $400,000, will enable outreach activities, workshops, and conferences that build jurisdictional and regional research capacity.

Number of People Involved in EPSCoR Activities

	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
Senior Researchers	485	527	555
Other Professionals	134	152	155
Postdoctorates	42	45	47
Graduate Students	367	400	405
Undergraduate Students	364	402	411
Total Number of People	1,392	1,526	1,573

PERFORMANCE

The FY 2009 Request is aligned to reflect funding levels associated with NSF's four strategic outcome goals stated in the FY 2006-2011 Strategic Plan. These goals provide an overarching framework for progress in fundamental research and education and facilitate budget and performance integration.

Integrative Activities
By Strategic Outcome Goal
(Dollars in Millions)

	FY 2007 Actuals	FY 2008 Estimate	FY 2009 Request	Change over FY 2008 Estimate Amount	Percent
Discovery[1,2,3]	$115.20	$126.18	$143.49	$17.31	13.7%
Learning	9.19	9.19	13.56	4.37	47.6%
Research Infrastructure	94.32	96.14	118.04	21.90	22.8%
Stewardship	0.74	0.76	0.91	0.15	19.7%
Total, IA	$219.45	$232.27	$276.00	$43.73	18.8%

Totals may not add due to rounding.

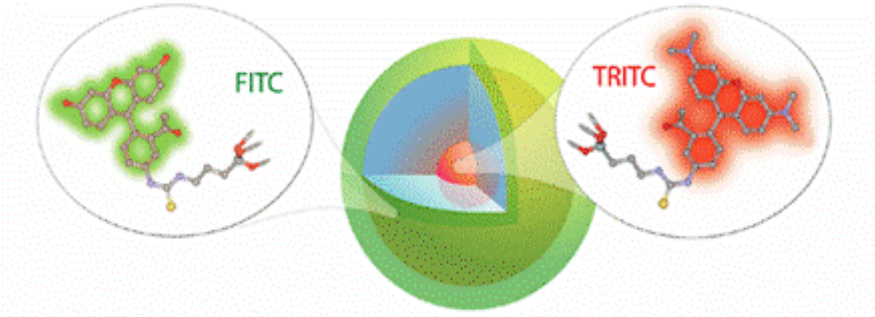
[1] Funding for Communicating Science Broadly is not included in numbers for FY 2007 and FY 2008. This effort was funded through Research and Related Activities Program Related Administration prior to FY 2009. See table on page IA-2 for detail.

[2] Funding for EPSCoR is shown for all years for comparability. EPSCoR was transferred from the Education and Human Resources appropriation to the Research and Related Activities appropriation in FY 2008.

[3] Funding for the Research and Development in the US (RaDiUS) database is reflected in FY 2007 Actuals and FY 2008 Estimates. FY 2009 funding is presented within Research.gov (see the Stewardship chapter).

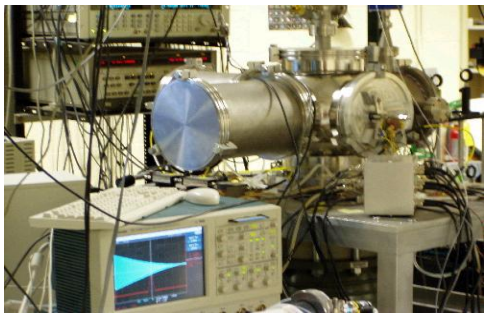
Recent Research Highlights

► **Moving Toward Single Particle Laboratories:** A research group in the Nanobiotechnology Center at Cornell University, a NSF Science and Technology Center, has developed a new design for labeling molecules with color-coded particles, increasing understanding of how diseases attack cells in the body and of the rapid growth of cancer cells in tumors. These engineered fluorescent silica nanoparticles can significantly enhance the brightness and stability of the dye molecules, and may be used to tag the precise location of a specific chemical compound in a living cell, such as in antibody recognition, as well as sense and report on the changing local chemical environment in a cell. (ENG/STC).



Schematic of the silica nanoparticle sensor architecture showing internal reference dye sequestered within the particle, and sensor dye distributed at the surface to maximize environmental exposure. *Credit: Andrew Burns, Prabuddha Sengupta, Barbara Baird, Ulrich Wiesner.*

► **Mission Impossible: An Innovative Microwave Spectrometer for Real Life Chemical Detection:** A University of Virginia research team has developed a new technique to identify chemical agents. This technique has dramatically reduced the time required for study of chemical structure in the gas phase, using a variety of analytical chemistry applications, such as breath analysis and detection of chemical warfare agents. The team also produced a microwave spectrometer that measures a much broader range of microwave frequencies than other spectrometers. The new microwave, known as "Chirped Pulse Fourier Transform Microwave," also allows the user to choose a desired sensitivity when obtaining measurements. (MPS/MRI).



Picture of the 11 GHz broadband Fourier transform microwave spectrometer (FTMW). *Credit: Photograph by Gordon G. Brown, Department of Chemistry, University of Virginia.*

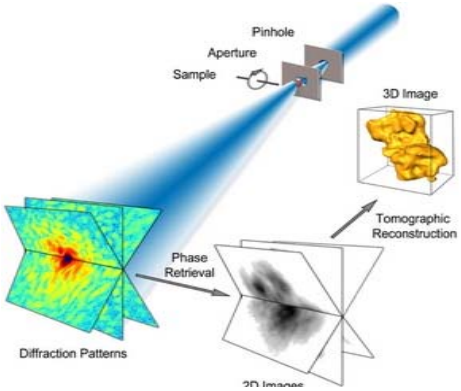


Diagram of X-ray imaging system for 3-D images. *Credit: UCLA.*

► **X-ray Vision in 3-D:** A new instrument produces three-dimensional images inside solid structures showing details 200,000 times smaller than the diameter of a human hair. Using one of the most powerful X-ray sources in the world, UCLA scientists have studied the interior structure of small particles of Gallium nitride – used to produce the blue light required for DVDs – to hold large quantities of high-definition video programming. They illustrated that an internal Gallium nitride and Gallium oxide structure partly controls the electronic properties of this material. The new imaging system produces 3-D images, shows fine structural details, maintains the integrity of the material under study, and works on material not in crystalline form. (MPS/MRI).

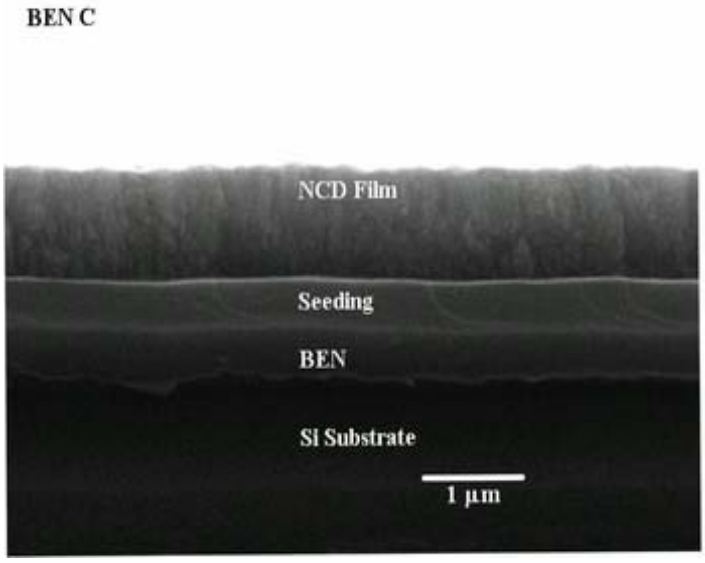
► **High-Performance Computing Infrastructure for Remote Work and Collaboration:** Major Research Instrumentation (MRI) provides a high performance computing infrastructure, resources, and training to a broad base of users, enabling researchers to view graphical output and engage in remote work and collaboration. With the help of University of Nebraska-Lincoln's PrairieFire supercomputer, researchers have generated many visualizations of the gold clusters' structure of nanocages. "Free-standing hollow cage structures," as they are also called, may carry useful atoms for medical or industrial purposes. This work was the first to combine quantum chemistry calculations with a powerful computerized search technique to identify previously unknown nano-sized structures and substances. Another team of scientists has developed a new way to rapidly identify cysteines, i.e., amino acids in proteins that have been found to play a role in heart disease and other diseases. (CISE/MRI).

This illustration shows a hollow nanocage made of 17 gold atoms. University of Nebraska-Lincoln researchers discovered the first free-standing hollow cage structures composed of clusters of pure gold atoms using the PrairieFire supercomputer. *Credit: University of Nebraska-Lincoln.*

Dr. Wayne Seames (center), SUNRISE Director and principal inventor of the UND biojet fuel process, observes as graduate students Autumn Dockter (left) and Swapnilkumar Gandhi (right) distill a test sample of biojet fuel. *Credit: Chuck Kimmerle, Photographer, Office of University Relations, University of North Dakota.*

► **Biojet Fuel from Crop Oils Takes Off:** With support from NSF's Experimental Program to Stimulate Competitive Research (EPSCoR), the SUNRISE research group of the University of North Dakota has developed an oilseed-based biojet fuel for aviation turbines and diesel engines that withstands cold temperatures and is more stable than traditional biodiesel fuels. The SUNRISE team is developing the technology to reduce the oil extraction cost specifically for biojet fuel application so that it is more cost effective than other fuels. SUNRISE also incorporates the research into chemistry and chemical engineering courses at the university, and educates the state's agricultural and financial communities and political leaders about biofuels and their potential economic impact. (OIA/EPSCoR).

► **Diamond Nanoparticles Improve Electrical Systems, Protective Coatings:** The University of Puerto Rico and the Center for Hierarchical Manufacturing at the University of Massachusetts, Amherst made a scientific and technological breakthrough that enables the direct integration of diamond nanoparticles into electronic components for widespread applications. These applications include protective coating for medical implants, environmental sensors, optical components exposed to harsh environments, and improved electrodes for electrical uses. The Diamond Nanotechnology Project was sponsored by NSF through EPSCoR. The University of Puerto Rico recently submitted to the U.S. Patent and Trademark Office a disclosure document for this development entitled, "Method to Synthesize Diamond on Polymers, Semiconductors, and Other Temperature-Sensitive Materials." (OIA/EPSCoR).



Scanning microscopy image showing the integration of nanocrystalline diamond (NCD) with semiconducting (Si) materials for electronic applications using bias-enhanced nucleation (BEN). *Credit: University of Puerto Rico.*