



Research Capacity Impacts 2013 Report

Alberta 
Innovation and Advanced
Education

Research Capacity Program

Impacts Report

Coordinating Research in Alberta - The Alberta Research and Innovation Plan

Coordination and consultation between GoA ministries and Alberta Innovates corporations has enabled the annual development of the Alberta Research and Innovation Plan (ARIP).

The ARIP conveys research directions, key outcomes, and priorities for the research and innovation system that were collaboratively developed by GoA ministries and Alberta Innovates corporations.

The ARIP is intended to encourage alignment of research and innovation efforts in Alberta. An effective and aligned research and innovation system is critical to facilitate the pursuit of the GoA's broad directions of advancing worldleading resource stewardship, securing Alberta's economic future and investing in families and communities.

To strengthen the research and innovation system and contribute to prosperity and quality of life, the ARIP supports three core outcomes:

Outcome: Effective Resource and Environmental Management

Through focused research, funding, and collaboration Alberta has the knowledge and technologies to support sustainable and efficient resource development while minimizing and mitigating the overall environmental impact of activities.

Outcome: Broadened Economic Base

Through focused research, innovation, and collaborations Alberta Industry has the knowledge and capacity to build on key areas of economic strength, and commercialize new and improved products and services for the global economy.

Outcome: Resilient, Healthy Communities

Through focused research, innovation and collaborations Alberta supports and advances individuals, families, groups and communities to enable safe supportive environments, maintain health, improve prevention, and respond positively to adversity with a particular focus on vulnerable and disadvantaged individuals and communities.

From these three outcomes, research and innovation priorities are identified to advance work in areas critical to the prosperity and well-being of Albertans.

Enabling Environments:

Five enabling environments of people, infrastructure, platform technologies, industry development, and system linkages represent the core mechanisms through which provincially-funded research and innovation is supported in Alberta.



People - Recruit, retain, and develop skilled and talented people to ensure Alberta has the capacity to address existing and emerging opportunities, and the workforce to meet the needs of Alberta's knowledge-inspired economy.

Infrastructure - Build, enhance, and sustain leading-edge infrastructure that supports research excellence and innovation activities focused on the Alberta Research and Innovation Plan priorities and broader strategic areas such as informatics and analytics.

Platform Technologies - Provide strategic support for core facilities and technologies (physical assets), and the requisite expertise for their use, which have extensive application across disciplines and sectors.

Industry Development - Support an environment that enables industry to perform, access, and apply research results and innovations to increase industry capacity and competitiveness.

System Linkages - Develop and enhance a system between the government, research and business communities that is collaborative, integrated, and coordinated.

The Department of Innovation and Advanced Education (IAE) manages and funds investments in science and research that support the development of innovation in Alberta. The goal is to strengthen the province's innovation capacity by making research investments in the enabling environments at Alberta's research intensive post-secondary institutions.

Through the Research Capacity Program (RCP), new research equipment investments ensure that Alberta's researchers acquire cutting-edge tools to conduct innovative science, which in turn accelerates the development and commercialization of ideas that impact the Alberta economy. Additionally, RCP investments support the retention, recruitment, and development of the brightest innovators and scientists by providing them with the funding, expertise, recognition and facilities they need to succeed.

The RCP also serves as important mechanisms for leveraging funds from the federal Canada Foundation for Innovation (CFI), the private sector and other sources to maximize the research dollars flowing into Alberta's research priority areas.

The RCP leverages federal and private sector funds to maximize research dollars flowing into Alberta.

The Program RCP serves as an important mechanism for leveraging funds from the federal Canada Foundation for Innovation (CFI), the private sector, and other sources in order to maximize the research dollars flowing into Alberta. Researchers from Alberta universities may apply to both the CFI's Leaders Opportunity Fund and to RCP for their project's funding. Applicants may ask for up to 40% of the total project costs from the federal government and also up to 40% funding from the Alberta government. The remaining funding is obtained from the private sector, other research institutions or from universities (Chart 1).

The RCP is focused on maintaining a strong base of research capacity by supporting the recruitment, retention, and development of skilled and talented people, and by building, enhancing, and sustaining leading-edge research and innovation infrastructure. As such, the RCP places a high priority on innovative research and scientific excellence and, like the CFI, invests in infrastructure that will enable researchers, institutions, and their partners, to develop exceptional research programs and transformative research.

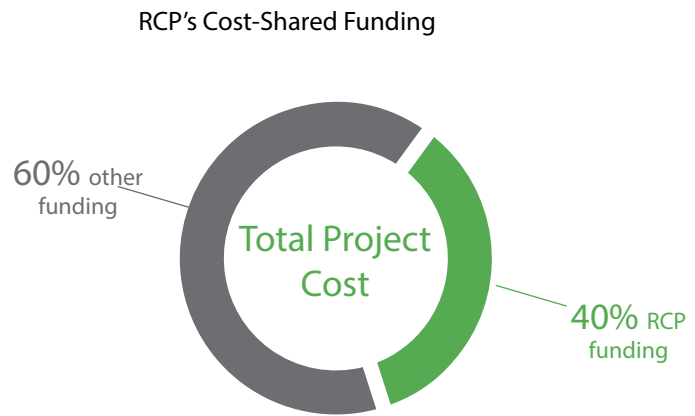
Through the ARIP, the RCP also coordinates with Alberta Innovates corporations and Government Departments to ensure that capacity is built within Alberta's strategic research areas and that small and large equipment investments complement other targeted provincial funding. The RCP supports the ARIP strategies with a focus on building Alberta's research strengths in the areas of energy and environment, bio-industries and health, as well as in the core areas of omics, nanotechnology, and information and communications technology (ICT).

The RCP and earlier programs funded 408 infrastructure projects between 2000 and 2012. During this period, the RCP strategically invested nearly \$253 million to enable the significant increase of research capacity in Alberta. The total value of these projects was over \$1.03 billion, with the remainder of the funding derived from the federal government, the private sector, and non-profit sources.

In addition, RCP funding leveraged approximately 75% of the total project cost of \$1.03 billion. (Chart 2).

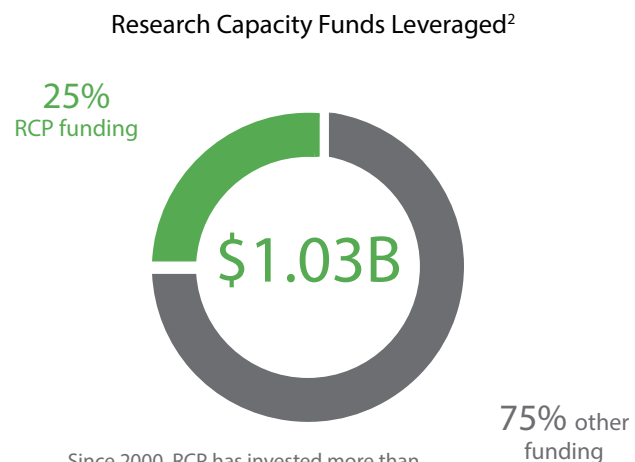
Further details on RCP projects can be found in the Project List 2008-2012.

Chart 1



RCP funds provide up to 40% of the project costs, enabling projects to leverage support from the Canada Foundation for Innovation and other sources.

Chart 2



Since 2000, RCP has invested more than \$253 million and has leveraged \$776 million more in other funding, bringing a total of \$1.03 billion to support research and innovation activities in Alberta.

¹Projects may include equipment, construction, renovations, specimens, and databases. Proposals must address strategic, fundamental infrastructure needs related to maintaining or enhancing the competitiveness of the Alberta university research system and contribute to Alberta's economic competitiveness and/or quality of life.

²Some Alberta investments have helped to leverage significant national facilities, such as the Canadian Light Source, and Compute Canada, thus increasing the overall leverage of the program.

Impacts of Completed RCP Projects

The Alberta government recognizes that it must invest wisely to compete with other jurisdictions nationally and internationally to effectively build the province's research capacity, and RCP is proving to be an integral means to ensuring that the right investments are indeed being made – ones that support the outcomes, enabling environments and the promise for a successful return for our future. By attracting and retaining highly qualified people with equipment and facilities, the RCP is creating a climate that builds synergy and collaborations among our leading researchers and provides state-of-the-art training opportunities for graduate students - the next generation of high quality innovators. In fact, the highlighted large equipment projects that you will read about in this report are evidence that Alberta's research investments are placing the province at the forefront of the new knowledge frontier.

Multicomponent Seismic Data Acquisition System

Evidence from petroleum studies show that oil, gas and CO₂ can be stored in the deep underground in depleted oil and gas fields and deep saline formations. For more than 40 years the oil industry has injected CO₂ in depleted oil reservoirs for the recovery of additional product through enhanced oil recovery. Natural analogs to CO₂ storage exist throughout Canada, where CO₂ has been naturally trapped in confined geologic layers and structures deep below the surface of the earth. Lessons learned from natural systems, enhanced oil recovery operations, gas storage, and sponsored CO₂ storage projects are all important for developing storage technologies for a future carbon capture and storage (CCS) industry.

CCS is an important element in Canada's emissions reduction strategy. Of critical importance to safe development and public acceptance of CCS is the ability to quantitatively track the injected CO₂ in the storage formation in order to detect and remediate any leaks. This verification of storage will become a regulatory requirement for commercial projects. Ultimately, reductions in greenhouse gas emissions is critical for Alberta and necessary for the future health and environment of its citizens.

To this end, researchers at the University of Calgary are working to develop monitoring, measurement, and verification technologies and protocols that will allow for the stable, secure storage of CO₂. Dr. Don Lawton plays a key leadership role in this field, both as the Director of the Fold-Fault Research Project (FRP), which involves integrated geophysical and geological research into the 3-D geometry and evolution of underground structures of economic and academic interest in fold and thrust belts; and as Associate Director of the Consortium for Research in Elastic Wave Exploration Seismology (CREWES).

The research infrastructure provided by the RCP has enabled Dr. Lawton to investigate how best to acquire, process and interpret seismic data and near surface geophysical information for environmental and commercial applications, including the monitoring the secure geological storage of CO₂. The

infrastructure has had a strong impact on collaborations between geophysics researchers at the University of Calgary and collaborating industry partners. Dr. Lawton's research into improvements to seismic imaging is sponsored by 30 international companies who contribute \$1.4M in direct revenues.

The infrastructure has facilitated several collaborative projects related to seismic monitoring through Carbon Management Canada (CMC), and also through the Mathematics of Information Technology and Complex Systems

(MITACS) Internships. Dr. Lawton's research group is planning collaborations on CCS projects with researchers from University of British Columbia, University of Victoria, University of Toronto, and the Institut National de la Recherche Scientifique. CREWES infrastructure has also been used collaboratively, to research the Christchurch, NZ earthquakes in 2011 for hazard and risk assessment information for the NZ government.

From a training perspective, the infrastructure is continuing to be a valuable asset in recruiting graduate students to the University of Calgary. CREWES and CMC currently have 40 graduate students in the program.

Presentations at international meetings of data acquired by the infrastructure have been an excellent recruiting tool. No other university in Canada and only a few in the US have access to this advanced level of infrastructure for training and research.



Dr. Don C. Lawton, Professor and Canadian Society of Exploration Geophysicists Chair University of Calgary

Greenhouse gas reduction supports 'Effective Resource and Environmental Management'

WestGrid: The Western Canada Research Computing Grid

High Performance Computing (HPC) is the use of supercomputers to power through massive sets of data to find information, make meaningful correlations, and solve large and complex problems. Supercomputers are the world's fastest computers at the frontline of contemporary processing capacity--particularly speed of calculation.



Dr. Jonathan Schaeffer, Dean of the Faculty of Science at the University of Alberta and co-founder of WestGrid

HPC is transforming research in Canadian universities and industry and is used widely for computationally-intensive tasks in various fields, including quantum mechanics, weather forecasting, climate research, oil and gas exploration, molecular modeling, and physical simulations.

Computer simulations and models now supplement or even supplant traditional field or laboratory experiments in many disciplines. These studies open up otherwise inaccessible realms and enable insights that were inconceivable a few years ago by enabling the analysis of massive data sets. For instance, new optical simulation software provided by a Canadian software company has enabled WestGrid researchers to model light to determine how it interacts with matter at the nanoscale - impacting biomedical, display technology, communication, optical storage, semiconductor manufacturing and solid-state lighting industries. Understanding the interaction of light and matter is important in developing high efficiency solar cells, biological sensors and optical interconnects for next-generation microprocessing chips.

In 1999, Canada occupied an inconsequential position in HPC-based research, but that year saw the first funding of HPC by the Canada Foundation for Innovation. Early CFI and RCP investments at the institutional level built the platform upon which the distributed WestGrid network was established. Platform technologies are a set of base technologies from which further technologies, processes or products are built. The HPC platform is a core feature of Alberta's research and innovation system that attract talented people and industry. Data collection and use underpins all areas of research, and utilizing the information contained within big-data repositories are strategies being developed by the Government of Alberta.

WestGrid is used by researchers whose computing needs exceed the capabilities of their own research group or department. WestGrid encompasses the distributed HPC resources of 14 partner institutions across British Columbia, Alberta, Saskatchewan and Manitoba. Alberta members of WestGrid are the Universities of Alberta, Calgary, and Lethbridge, Athabasca University, and The Banff Centre. Further investments in Compute/Calcul have connected HPC resources across Canada - improving access, efficiency and governance to optimize the use of the significant public investment in HPC.

Over 100 researchers from the three universities representing most faculties have been greatly assisted by the infrastructure, as it provides the means to further their intensifying research activities. Well-developed platform capacity is a core feature of Alberta's research and innovation system which attracts talented people and industry involvement to the province. In the last ten years, the availability of the infrastructure played a key role in the retention of 41 highly qualified personnel and aided in the recruitment of an additional ten. In that time, the WestGrid infrastructure trained approximately 350 people, all of whom have benefited in their research from the WestGrid HPC infrastructure. Along with WestGrid, the other regional HPC consortia in Canada representing over 50 institutions and over one thousand university faculty members doing computationally based research and are supported by Compute/Calcul Canada (CC).

**High performance
computing – a platform
technology – supports
'Broadened Economic
Base'**

Oil Sands and Coal Interfacial Engineering Facility (OSCIEF)

The Oil Sands and Coal Interfacial Engineering Facility is a unique infrastructure for observation of colloidal and interfacial phenomena associated with oil sands processing and clean coal technology. It enables an understanding of the micro- and nano-scale phenomena underlying large scale processes used in the Alberta energy sector and associated industries.

Located at the National Institute for Nanotechnology (NINT) at the University of Alberta, OSCIEF takes advantage of the multi-disciplinary environment, which includes researchers in physics, chemistry, engineering, biology, informatics, pharmacy and medicine. The facility provides the latest analytical equipment to attain greater insight into energy production, particularly the exploration of interfacial phenomena associated with non-renewable resources and water. The RCP-funded infrastructure is enabling the development of innovative clean production technologies, supporting the key outcome of effective resource and environmental management.

How does a mechanical engineering and nanotechnology fit together? For Dr. Bhattacharjee, the bridge is his expertise in complex fluids and his interest in clean water. A researcher with an eclectic background, he was one of the first cross appointments from the University of Alberta to the new National Institute for Nanotechnology. He also holds a Natural Sciences and Engineering Research Council of Canada (NSERC) Industrial Research Chair in Water Quality Management for Oil Sands Extraction in Mechanical Engineering.

Dr. Bhattacharjee's background in dealing with pulp and paper, membrane filtration, drinking water, and nanotechnology is unique. His research involves the separation of the harmful contaminants of water and returning it back to its pristine states. Dr. Bhattacharjee and his research team are applying their research to cleaning water used in oil sands extraction to create a more water efficient process and mitigate the environmental effects. Some of the technologies that will be investigated are bio upgrading, dielectrophoretic separation of water droplets from diluted bitumen during bitumen extraction, membrane based water recycling from tailings, and novel techniques for characterization of bitumen and coal components. This new wave of innovation can potentially revolutionize bitumen extraction and upgrading, rendering the processes environmentally benign, less energy intensive, and less burdensome to the natural water resources. The industrial relevance of this project is strongly reflected in the support shown by several oil sands industries, including Canadian Natural Resources Limited, Champion Technologies Limited, Suncor Energy Inc., and Syncrude Canada Limited - have all expressed interest in the research.

In cooperation with researchers at the University of Calgary and NINT, Dr. Subir Bhattacharjee and his colleagues will infuse nov-

el ideas and technologies in the oil sands processing and coal cleaning sectors. The OSCIEF is a critical facility supporting a range of researchers, including international leaders in energy research. For example, Dr. Zhenghe Xu, NSERC Industrial Research Chair in Oil Sands Engineering, makes significant use of the facility. The availability of the infrastructure is accelerating the research of Dr. Thomas Thundat, who was recently recruited to the University of Alberta as a Canada Excellence Research Chair in Oil Sands Molecular Engineering. The infrastructure was also important for establishing the collaboration of Dr. Bhattacharjee with Dr. Sushanta Mitra, which led to a multi-million dollar grant from Carbon Management Canada on in-situ coal gasification.



Dr. Subir Bhattacharjee, Director of OSCIEF and the NINT Building, University of Alberta

**Clean production
technology supports
'Effective Resource
and Environmental
Management'**

Complementing this active research field, is the increasing number of requests from excellent quality students and researchers from around the world, who are interested in joining the program. This growth and focus on high-quality personnel will be important to develop a critical mass of researchers who will continue to offer solutions of value for Alberta's oil industry.

Alberta Diabetes Institute (ADI)

Dr. Ray Rajotte, from the University of Alberta, is a recognized pioneer in the treatment of diabetes, a disease which leaves the body unable to produce its own insulin, a hormone that regulates sugars in the blood. In 1999, Dr. Rajotte's research team isolated islets, clusters of insulin-producing cells from the pancreas, and transplanted them into the livers of patients with Type 1 diabetes. The procedure, known as the Edmonton Protocol, frees most patients from the need for daily injections and is hailed as the biggest advance in research since the discovery of insulin.

The novel procedure, now used world-wide, led to the creation of the Alberta Diabetes Institute (ADI) at the University of Alberta, which co-locates researchers, support staff, doctors and nutritionists.

The \$300-million Institute at the University of Alberta was built with both public and private funding. Funding was used to build a world-class institute and purchase equipment related to research and development for treating diabetes. The RCP-funded infrastructure at the ADI provides technologies for individual health, wellness and choice for Albertans, supporting the key outcome of healthy, resilient communities.

The Alberta Diabetes Institute (ADI) is comprised of 25 principal investigators and their teams - crossing many disciplines and sharing space, equipment, and ideas. Collectively, they are conducting research activities spanning basic to clinical research - from islet studies, immunology, secondary complications, risk and prevention, and clinical/population studies.

The infrastructure provided in part by the RCP, has allowed researchers to undertake cutting edge research in numerous areas of diabetes research. High resolution instruments like the confocal microscope in Dr. MacDonald's Imaging Core have allowed researchers to identify immune cells and processes that cause rejections of islet grafts. The Molecular Biology Core led by Dr. Elliott provides state-of-the-art support for DNA cloning, gene expression, real time PCR, and whole body imaging at the microscopic level to assess cell trafficking at the site of transplant. The Histology Core directed by Dr. Korbitt provides tissue samples for all scientists in ADI doing animal model and human clinical research. Dr. Rajotte's Small Animal Core provides rodent islets and transplants these in animal models for researchers to use in various experiments. The Human Islet Research Core under Dr. MacDonald provides islets from diabetic donors that can be used by diabetes researchers.

A major breakthrough of the ADI was the successful curing of diabetes in non-human primates through xenotransplantation of pig islets. The impact of this treatment has a far greater potential than the Edmonton Protocol since neonatal pig islets are virtually unlimited and would allow more transplants to be carried out. Research is now underway with Emory University in Atlanta to refine pig

islets through genetic modification and co-transplantation with other cells that improve tolerance and survival. ADI is also collaborating with the University of Minnesota and the University of Pittsburgh to procure islets from genetically modified pigs that have improved tolerance and survival characteristics. As a result of their work, numerous clinical trials have been placed at ADI's Clinical Research Unit, connecting industry with researchers and trainees.



Dr. Ray Rajotte, founding Scientific Director of the Alberta Diabetes Institute, University of Alberta

Training of clinical scientists is a high priority for the ADI. The Institute, with its core infrastructure, is a key factor in recruiting top students to the University of Alberta medical and PhD programs. These students will become the future clinical scientists of Canada working at universities across Canada and North America.

**Improved diabetes
treatments supports
'Resilient, Healthy
Communities'**

Integrating Research in Osteoarthritis: From the Bedside to the Bench and Back Again

What is now the McCaig Institute originated as a small research group within the Faculty of Medicine at the University of Calgary in the fall of 1988. With the involvement of basic scientists, rheumatologists, orthopedic surgeons, community leaders, and later kinesiologists and biomedical engineers, the McCaig Institute for Bone and Joint Health (MIBJH) officially opened in March 1992.

The McCaig Institute is comprised of a consortium of researchers who bring diverse technologies and perspectives to focus on basic and clinical research, with the goal of understanding the basis for loss of bone and joint health, and how these debilitating chronic diseases and conditions develop. The Institute has 109 faculty, 85 trainees, and 50 laboratory personnel from 5 different faculties at the University of Calgary and 5 partner institutions (University of Alberta, Oxford University, University of Lethbridge, University of Michigan, and the Institute for Reconstructive Sciences in Medicine).

The RCP-funded infrastructure at the McCaig Institute has supported the establishment of three core facilities: the Cellular and Molecular Mechanics Facility, the Tissue and Joint Mechanics Facility, and the Human Assessment Facility. The new infrastructure is tied directly to the previous investment to form a cohesive research environment linking the McCaig Institute with the provincial Strategic Clinical Network on Bone and Joint Health (SCN) of Alberta Health Services. The new facilities allow researchers at the University of Calgary to conduct research that is transforming the way musculoskeletal health care is delivered in Alberta. This basic to clinical research, translating new knowledge into practice, meets the needs of Albertans for improved health in our communities.

The financial and personal burden of musculoskeletal conditions in Alberta, Canada and globally is significant. Research at the McCaig Institute has made important advancements towards improving the diagnosis, treatment and prevention of a variety of musculoskeletal conditions, including osteoarthritis, osteoporosis and rheumatoid arthritis, and these innovations will have long-term ramifications on the quality of life of those affected by musculoskeletal diseases and injuries, as well as the health care expenditures associated with these conditions. For example, Dr. Cy Frank's research identified potential efficiencies in the health care pathway for hip and knee arthroplasty. Changes made to the health delivery system as a result, created annual savings of \$10M over two years. A similar model is currently being developed for rheumatoid arthritis.

Research discoveries made at the McCaig Institute are quickly translated into better treatments for patients across Alberta through these partnerships with Calgary Bone & Joint Health, as well as agencies such as The Arthritis Society. A number of spin-



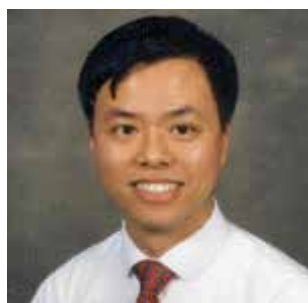
Tanin Schmidt, PhD in both Kinesiology & Mechanical and Manufacturing Engineering and member of the McCaig Institute for Bone and Joint Health

off companies have been created or expanded through research that has relied on the RCP funded infrastructure, including Mitogen, Eve Technologies, Lubris, Tenet Medical Engineering, Zymetrix and Numerics88. All but one of these companies are based in Alberta and they contribute to the economic growth of the province through creating new jobs. McCaig Institute researchers also hold a number of patents, including two that have recently been submitted on surgical assist devices that improve the alignment of total joint replacement components during total knee and total hip arthroplasty.

**Improved bone and
joint health supports
'Resilient, Healthy
Communities'**

Recent Recruitment and Retention

A key component of quality research is quality people. Building and growing Alberta's research capacity in each of the strategic priority areas requires the recruitment of promising new researchers and the recruitment and retention of 'research stars' with a demonstrated record of excellence. The Small Equipment Grants (SEG) stream of the RCP is being utilized along with other programs to recruit new research talent to the province, and to retain our best performers. The following are examples of SEG research project awards for new researchers brought to Alberta universities and current researchers who require support for renewal of their research equipment.



Fabrication and Testing Facilities for Carbon Nanotube-based Devices and Circuits

Dr. Jie Chen is an Associate Professor in the Department of Electrical and Computer Engineering at the University of Alberta. His training at the University of Maryland at College Park is in nanoelectronics, biomedical devices, circuit designs, signal processing and sensors. As an Assistant Professor at Brown University in Rhode Island, Dr. Chen developed a proof-of-concept ultra-low power microchip that uses significantly less power than the current market technologies. He is working with TEC Edmonton to patent his designs.



Novel Reservoir Simulation Using Parallel and Hardware Acceleration

Dr. Ian Gates is an Associate Professor with the Department of Chemical and Petroleum Engineering at the University of Calgary. The University recruited Dr. Gates from a Research Specialist position with Imperial Oil Ltd where he focused on oil sands development and research. Dr. Gates' research focuses on reservoir engineering and thermal and thermal-solvent recovery processes. He holds an NSERC Discovery grant and is involved in the Alberta Innovates - Energy and Environment Solutions, Centre for *In Situ* Energy.



Scientific Computing Infrastructure for CO₂ Injection Enhanced Oil Recovery

Dr. John Chen was recently recruited to the Schulich School of Engineering at the University of Calgary. He brings academic and private sector experience to Alberta from previous positions with Southern Methodist University in Dallas, and Mobil Technology Company. Dr. Chen models various types of flows in petroleum reservoirs based on his knowledge of mathematics and computer science. He has developed software that is currently being used to model flows in select oil reservoirs around the world.



Confocal Imaging System for the Analysis and Optimization of Engineered Tissues

Dr. Arindom Sen is an Associate Professor in the Department of Chemical and Petroleum Engineering at the University of Calgary. His primary research program is in the area of biochemical and biomedical engineering. Dr. Sen focuses on the development of adult stem cell based therapies by combining principles from the biological sciences, engineering, and medicine. His research program is aimed at scaling-up stem cell/tissue production for clinical applications such as the treatment of Parkinson's disease and diabetes.



Measuring Communication Between the Endoplasmic Reticulum (ER) and Mitochondria with Novel Fluorescent Probes in Live Cells

Dr. Thomas Simmen is an Associate Professor in the Department of Cell Biology at the University of Alberta. His laboratory focuses on the identification of signaling proteins on the mitochondria-associated cell membrane and on understanding their function. Dr. Simmen expects his findings to have profound impact on future approaches to fight cancer, as tweaking signaling on a mitochondria-associated membrane may make disease treatment more effective.



Alberta Bone and Joint Health Technology Assessment Decision Support Laboratory

Dr. Deborah Marshall is an Associate Professor Department of Community Health Sciences at the University of Calgary. Dr. Marshall's research interests include economic evaluation of health care programs using decision analysis methodologies and health technology assessment. The RCP award will assist in the development of new evidence-based approaches to improve the quality and efficiency of bone and joint care. Specific applications of her work include the evaluation of personalized medicine and methods for measuring patient preferences in medical interventions.



New Imaging Technologies to Study Immune Receptors at the Single Molecule Level

Dr. Nicolas Touret is an Assistant Professor at the University of Alberta's Department of Biochemistry. His research focuses on studying the body's ability to protect against fungal infections. With the RCP funded infrastructure, the Touret Lab is using new imaging technologies, capable of resolving the behavior of single molecules, to understand the mechanisms involved in the initiation of immune responses when organisms are challenged with pathogens.



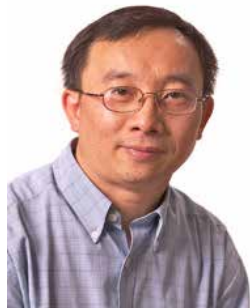
Airborne Electromagnetic Sea Ice Thickness Sensor

Dr. Christian Haas is a Professor specializing in sea ice and electromagnetics at the University of Alberta's Department of Earth and Atmospheric Sciences. The goal of Dr. Haas's research is to improve ice thickness observations and to obtain systematic, large-scale information of ice thickness and ice mass balance change in key regions of the Arctic and Antarctic. The RCP funded equipment will be used to validate satellite measurements and contribute to ice engineering and offshore operations as well as ice travel safety.



Post-Translational Modifications and the Proteome During Apoptosis

Dr. Richard Fahlman is an Assistant Professor Department of Biochemistry at the University of Alberta.. The RCP funded high definition mass spectrometer system will further the understanding of multiple myeloma, a form of cancer of the plasma cells. The research aims to generate insight into cancers that appear to be resistant to conventional treatments, and may lead to the discovery of more effective treatments for these cancers.



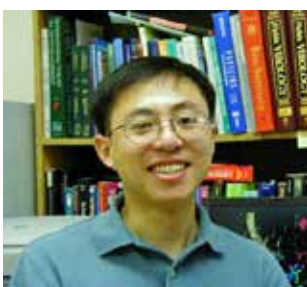
A Microbiological Culture and Biochemistry Laboratory for Carbohydrate Research

Dr. Chang-Chun Ling is an Associate Professor with the Department of Chemistry at the University of Calgary. He is also Principal Investigator with the Alberta Glycomics Centre. The RCP funded infrastructure supports exploring treatments for cancer and other infectious diseases that combines the use of organic chemistry and microbiology. Dr. Ling's study of the interaction between carbohydrates and proteins, plays an important role in understanding conditions such as cancer, viruses, autoimmune diseases and inflammation.



Bioenergy and the Uncultured Microbial Majority

Dr. Peter Dunfield works at the University of Calgary as an Associate Professor in the Department of Biological Sciences. The RCP award helped establish a new environmental microbiology laboratory to study novel biotechnological applications of bacteria that will advance the use of microbial activity to meet environmental and industrial needs. For instance, some bacteria are able to consume methane, a major greenhouse gas, and therefore his research may present strategies for climate change mitigation and other applications. Dr. Dunfield's research combines modern cultivation techniques with DNA-based molecular methods to explore the metabolic potential of these bacterial species.



Microfocus X-ray Diffractometer

Dr. Kenneth Ng is an Associate Professor in the Department of Biological Sciences at the University of Calgary where he investigates how biological macromolecules function at the molecular level. As a part of the Alberta Glycomics Centre (AGC), Dr. Ng's lab interacts extensively with six other labs at the University of Alberta and at the University of Calgary to pursue interdisciplinary research investigating the diverse functions of carbohydrates and carbohydrate-binding proteins. The research equipment funded by the RCP will improve the quality of x-ray data enabling research on antiviral medications and treatment options for norovirus gastroenteritis and similar diseases.



In vivo Evaluation of Immune Tolerance

Dr. Troy Baldwin is an Assistant Professor in the Department of Medical Microbiology & Immunology at the University of Alberta. The RCP funded infrastructure will help improve the study of autoimmune disorders through further understanding of the role of the thymus, a specialized organ of the immune system. It is anticipated that this new knowledge will have an impact on the fields of organ transplantation and chronic infections such as Hepatitis B and C, and HIV.



Establishment of a Facility to Study Carcinogen Metabolism and Transmembrane Transport

Dr. Elaine Leslie is an Assistant Professor in the Department of Laboratory Medicine & Pathology, cross-appointed at the Department of Physiology at the University of Alberta. The research infrastructure provided by the RCP is used to investigate cellular metabolism, focusing on the transport of carcinogens across cell membranes. Dr. Leslie's research studies arsenic and tobacco smoke, two major contributors to cancer, and aims to develop new treatment options for the disease.



Molecular Analysis of the Host-Pathogen Interface

Dr. Stefan Pukatzki is an Assistant Professor in the Department of Medical Microbiology & Immunology at the University of Alberta where he studies the interaction between microbial pathogens and their hosts. The RCP award established a state-of-the-art molecular pathogenesis laboratory, which supports research aimed at developing new treatment strategies to fight bacterial infections. Dr. Pukatzki's approach is to identify compounds that interfere with the molecular interactions at the interface between bacterial pathogens and their hosts, which may advance treatments that interrupt the infectious process.



Structural and Functional Study of Membrane Proteins in Disease

Dr. Joanne Lemieux is an Assistant Professor Department of Biochemistry at the University of Alberta. With the RCP funded research infrastructure, Dr. Lemieux developed a modern membrane protein expression, purification, and crystallization facility capable of investigating how the functions of membrane proteins contribute to diseases such as Type 2 Diabetes, blindness, and Alzheimer's. The findings from preliminary research may lead to further developments in novel treatment options for these diseases.



Laboratory for Passive Seismic Imaging of Earth Processes

Dr. David Eaton works the University of Calgary as a Professor in the Department of Geophysics. His research focuses on passive and global seismology, with an emphasis on teleseismic studies of continental crust and earth's deep interior. With the research infrastructure funded by the RCP, Dr. Eaton developed a laboratory for passive seismic imaging of the earth's processes using naturally occurring mini earthquakes as a source of seismic waves instead of artificial methods such as dynamite or air guns. His laboratory offers the opportunity to advance a wide range of areas including earthquake hazard analysis, CO2 capture and storage, oil recovery efficiency and the earth's physical evolution.





Laboratory for Computational Structural Biology: Theoretical Gateway to Molecular Origins of Selective Ligand Binding to Membrane Proteins





Dr. Sergei Noskov is an Associate Professor in the Department of Biological Sciences at the University of Calgary. His primary research interest is to develop a greater understanding of how proteins on the cell surface or on a membrane within a cell bind to other molecules, which may become a powerful tool for advancing the effectiveness of therapeutic drugs and may provide insight into new methods of drug delivery.



RESEARCH INFRASTRUCTURE STREAM

Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2012/13	University of Alberta Centre for Functional, Structural, and Metabolic In Vivo Imaging of Disease	The infrastructure will update the two core University of Alberta human imaging research laboratories. Imaging technology has evolved rapidly over the last decade and the latest platforms are required for basic scientists and clinical researchers to develop and translate novel imaging methods. Research enabled by structural biology and imaging will inform health care delivery, including diagnosis and prognosis, and treatment methods.	 Christian Beaulieu	University of Alberta	\$17,527,812	\$5,500,000
2012/13	Energy Materials Characterization and Control (EMC2)	The equipment will allow the characterization and control of materials at the nanoscale to deliver new technologies for energy generation, conversion, storage, and conservation based on the development of new materials, systems, and devices for solar and fuel cells, catalysts, batteries, and new electronics. EMC2 will elevate the established research environment to the highest international level, and will enable transformative research and technology development.	 Kenneth Cadieu	University of Alberta	\$13,124,623	\$3,986,163
2012/13	Centre for Neural Interfaces and Rehabilitation Neuroscience (CNIRN)	CNIRN will facilitate the translation of basic nervous system research to the development of solutions for neurological problems and limb amputations. CNIRN will enable the development of critical interventions that will restore physical functions and prevent secondary complications. This will improve the lives of Canadians, contribute to the sustainability of the health care system, and place Alberta at the forefront of rehabilitation research.	 Vivian Mushahwar	University of Alberta	\$7,691,232	\$3,076,494
2012/13	SIFER (Stable Isotope Facility for Ecosystem Research) - Tracking Fluxes One Molecule at a Time	The Stable Isotope Facility for Ecosystem Research will pioneer research applications in ecosystem biogeochemistry and biodiversity and will trace the fate of nutrients and chemical pollutants through soils, plants, wildlife, and water resources in order to improve sustainable ecosystem management.	 Sylvie Quideau	University of Alberta	\$3,756,978	\$1,478,111
2012/13	Towards a Compact Light Source: A Dedicated Laser Wakefield Accelerator Endstation for Canada	The project will enhance the Advanced Laser Light Source in Varennes Québec, with the goal of achieving a compact laser-based synchrotron improving access to this technique. The proposal builds on the Canadian Light Source and the National Institute for Nanotechnology, advancing Canada's capacity in advanced materials. The application of such technology has wide ranging implications for energy, health, and value-added materials.	 Emil Hallin  Robert Fedosejevs	University of Alberta	\$1,358,600	\$41,499

Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2012/13	Enhancing the Spectromicroscopy Beamline and Endstations at the Candadian Light Source	The project will enhance the global scientific and technological leadership of the Canadian Light Source. The upgrades will expand the facility's role in advanced materials development (fuel cells, magnetic devices, strained semiconductors, biomedical implants) and establish new capabilities in imaging and analysis of cryo-cooled samples.	 Stephen Urquhart  Arthur Mar	University of Alberta	\$4,100,000	\$250,000
2012/13	An Integrative Approach for Translating Research to Improve Musculoskeletal Health	A musculoskeletal research centre will be established at the McCaig Institute for Bone and Joint Health that will complete an innovative knowledge transfer pipeline connecting basic and clinical research with partners embedded in Alberta's health system. The centre will provide rapid implementation of novel musculoskeletal health care solutions for every Albertan.	 Steven Boyd	University of Calgary	\$12,889,750	\$4,739,000
2008/09	Geomechanical/Reservoir Experimental Facility (GeoREF)	The GeoREF will provide the tools to gain critical knowledge of the behavior of oil sands, shale, and carbonates during thermal recovery processes. Research outcomes from the GeoREF will underpin the technology for carbon storage projects and support the sustainable, safe development of Alberta's unconventional hydrocarbon resources, including coal gasification.	 Rick Chalaturnyk	University of Alberta	\$4,078,511	\$1,630,061
2008/09	Ultraclean Isotope Analysis Facility for Innovative Geochronology	Dr. Creaser and his research team are world leaders in isotope geochemistry. The infrastructure provides the needed tools for innovative geochronology research in areas relating to energy and natural resources. The Isotope Analysis Facility will enable researchers to provide the scientific underpinning which guides industry in their efforts to explore and make use of mineral and petroleum resources.	 Robert Creaser	University of Alberta	\$1,292,627	\$517,051
2008/09	The Resolute Bay Incoherent Scatter Radar: A Space Science Initiative in Nunavut	The award will build a world-leading facility for direct ionospheric observations in Canada's North which will operate synergistically with a facility in the U.S. Arctic. RISR will enable researchers to study the significant effects of space weather on satellite and aircraft communication and navigation systems and its longer term effects on the environment and climate change. The RISR provides the Calgary region with commercialization opportunities in global navigation satellite systems, GPS accuracy, and new technologies to rapidly access remote data.	 Eric Donovan	University of Calgary	\$24,343,381	\$7,128,810
2008/09	Rapid and Secured Communication Network for Exchange of Medical Images in the Canadian Atherosclerosis Imaging Network (CAIN) - CFI National Award	CAIN is one of the leading national collaborative networks in Canada. The research infrastructure will create a rapid and secure communication network, state-of-the-art image management and analysis software, and innovative imaging technologies. This technology will enable the sharing of clinical and research data across the country to improve the diagnosis and treatment of heart disease.	 Richard Frayne	University of Calgary	\$3,043,418	\$1,217,367

Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2008/09	Canadian Longitudinal Study on Aging	The equipment purchased will enable the development of a tremendous source of long-term information which will be used to answer basic research, clinical, and population health questions. The award provides the equipment to collect health measurements from patient participants and the computational resources to share the data securely across this national network of researchers. The high quality of the data will allow researchers to address complex population health and policy questions related to an aging population which were otherwise not feasible.	 David Hogan	University of Calgary	\$957,552	\$383,021
2008/09	Subzero Facility for Processing and Analysis of Hydrocarbons in Pristine Planetary Samples	A unique facility will be built in Alberta so that researchers may store, process, and handle pristine astromaterials, including meteorites. The facility will protect the valuable samples from any further earth-based contamination that they could receive. This new facility will also support the work of Dr. John Shaw, NSERC Industrial Chair in Petroleum Thermodynamics at the University of Alberta.	 Christopher Herd	University of Alberta	\$434,005	\$173,602
2008/09	emSYSCAN: Embedded Systems Canada	emSYSCAN is a national embedded computerized systems initiative. The infrastructure will allow researchers to meet the challenge of the global shift from discrete chip-based electronics products to those that implement complete systems on a single computer chip. The network enables prototype development and provides access to a library of system components and computer-aided design tools through secure internet communication links. The research is closely linked to industry to enable rapid commercial deployment of new applications in the fields of information and computer technology, medicine, and biotechnology.	 Karan Kaler	University of Calgary	\$3,813,875	\$1,525,551
2008/09	Cell and Tissue Innovative Research Centre (CTIRC)	The funding will support the development of a specialized centre capable of producing clinical grade cells and tissues to treat a wide variety of chronic and acute diseases and injuries. The Centre will focus on developing insulin-producing cells for the treatment of diabetes, skin treatment for burn victims, and developing new treatments for people with lung disease. This type of facility will enhance and accelerate the possibility of developing commercial and clinical applications in Alberta.	 Gregory S Korbitt	University of Alberta	\$26,509,863	\$10,603,945
2008/09	ACWA: Advancing Canadian Wastewater Assets	The ACWA Research Facility will integrate engineering, chemical, and biological expertise with a full-scale research approach to address wastewater treatment and environmental water issues in Alberta. The ACWA initiative is an innovative collaboration with the City of Calgary's Pine Creek Wastewater Treatment Plant, through which scientists will investigate and demonstrate new technologies to treat contaminants and minimize their impacts on aquatic ecosystems and public health.	 Lee Jackson	University of Calgary	\$29,506,447	\$10,373,152
2008/09	ENVIRO-NET: Sensing our Changing Environment	The ENVIRO-NET infrastructure will provide unique research opportunities in sensor design, networking and communication, data mining, storage, retrieval, management, and analysis. The infrastructure will use integration of carbon flux measurement instruments and advanced GPS applications aimed at monitoring the response of boreal forests to industrial development and other climate change indicators. The infrastructure will position the University of Alberta as one of the key players worldwide in the design and implementation of wireless sensor networks for environmental monitoring and assessment.	 Arturo Sanchez-Azofeifa	University of Alberta	\$1,816,200	\$726,480







Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2008/09	Southern Alberta Group for Epigenetic Studies (SAGES) - Epigenetic Regulation of Cell Memory and Stress Responses	Epigenetics is the study of changes in appearance or gene expression that are not related to changes in the DNA sequence. This award will bring together researchers in the institution's areas of strength (neuroscience and molecular biology) to lead in this emerging area of research. SAGES will enable scientists to make major new discoveries related to improved understanding and treatment of human disease (e.g., cancer, Parkinson's Alzheimer's), new biofuel models, and environmental toxicology, to name a few.	 Robert Sutherland	University of Lethbridge	\$8,108,014	\$2,816,548
2008/09	Instrumentation for Molecular Breeding for Specialty Oils	The award will support the development of specialty oilseed crops, such as canola and flax for the production of enhanced oils for human health and nutrition. The integration of plant biotechnology and nutritional science will optimize the impact of the research. The project will strike a balance between scientific push and industrial pull to add value to Alberta's traditional crops.	 Randall Weselake	University of Alberta	\$5,830,110	\$2,329,057
2008/09	Regeneration Unit in Neurobiology (RUN)	The focus of this award is to provide the neurobiology research team with the tools required to apply innovative approaches to study the possibility of regeneration after major nerve and spinal cord injuries. The facilities will be amongst the best in the world and, in the hands of this strong team, will accelerate the development of new treatments for people with nerve and spinal cord injuries.	 Douglas Zochodne	University of Calgary	\$3,240,933	\$1,296,372
2008/09	Enhancing the Science: Polarized Photons and Improved Endstations for the SGM and PGM at the Canadian Light Source	The Canadian Light Source (CLS) award brings an already productive photon tool to the leading edge of light source imaging. The tool will enable researchers to view various materials, nanostructures, catalysts, and biological tissues. Research conducted at the facility is interdisciplinary and will impact many sectors, including agriculture, health, ICT, materials, mining, oil and gas, and pharmaceutical sciences.	 Jonathan Veinot	University of Alberta	\$4,047,255	\$150,943
2008/09	The Canadian Writing Research Collaboratory	The infrastructure will create a virtual online "lab" that will transform the study of Canadian writing by facilitating data sharing and analysis, networking, and collaboration for scholars worldwide, and establish a major open-access resource on Canadian writers and writing. It will enhance Alberta's information and communication technology infrastructure by providing a model for geographically distributed teams to work effectively to create high-quality knowledge resources for research, policy development, and industry collaboration.	 Susan Brown	University of Alberta	\$2,640,786	\$1,049,608
2008/09	Athabasca University Geophysical Observatory Upgrades of Research Infrastructure (AUGOURI)	The infrastructure will enhance the Athabasca University Geophysical Observatory and in turn strengthen and expand the AUGOURI's international collaborations with the world's leading space scientists. The research observatory will study the radiation belts that surround the planet, the northern lights, and their relation to an unknown mechanism called "substorms" which are able to interrupt electrical power grids on the earth.	 Martin Connors	Athabasca University	\$1,852,864	\$712,261

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2008/09	Alberta Particle Astrophysics Experiments at SNOLAB: SNO+ and DEAP/CLEAN	The SNOLAB project will keep Canada and Alberta at the international forefront of neutrino and dark matter physics. SNOLAB is a national research project, with strong international ties, to measure properties of particles that are critical to the formation and evolution of the universe. While the research is fundamental, there is long-term potential for contributions to understanding basic energy generation in the sun which impacts our climate systems and models.	 Aksel Hallin	University of Alberta	\$3,774,593	\$1,509,837
2008/09	New Control System for MTS Hydraulic Testing Machine - Part of CFI LEF Application: Centre for Industrial Application of Microcellular Plastics	The Centre will develop innovative products and processing technologies for microcellular plastics, a new generation of materials that exhibit superior mechanical performance and significantly improve their sound and thermal insulation properties. Researchers at the University of Alberta will provide fatigue resistance testing and evaluation of the new microcellular plastics.	 P-Y Ben Jar	University of Alberta	\$108,584	\$43,433
		25 Projects Total		TOTAL:	\$185,848,013	\$63,258,366

SMALL EQUIPMENT GRANTS AND COLLEGE-INDUSTRY INNOVATION STREAMS PROJECT LIST 2008-2012

Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2012/13	Electrophysiological Recordings and Calcium Imaging of Pain-Sensing Neurons in Inflammatory Conditions	Using a combination of molecular biological, electrophysiological, imaging and behavioural assessment techniques, the infrastructure for will enable researchers to asses the role of pore proteins in the mebrane of nerve cells that detect pain signals and to understand how aberrant function of these proteins is regulated in infammatory disease conditions.	 Christophe Altier	University of Calgary	\$131,795	\$52,718
2012/13	Visualizaton of Transplant Biology	Patients with organ failure frequently receive a replacement organ via transplantation. Despite immunosuppressive drug therapy, the transplants deteriorate through chronic rejection. With the infrastructure, researchers at the University of Alberta will seek to understand and prevent this deterioration utilizing new technologies that track thousands of molecules and cells important in rejection.	 Colin Anderson  Allan Murray  Lori West	University of Alberta	\$846,836	\$313,200
2012/13	Infrastructure for Characterization of Shape Memory Polymer Composites and Nano-Composites with Complex Fiber Architectures for Multifunctional Composite Materials Research	The project focuses on thermo-mechanical characterization and analysis of multifunctional composite and nano-composite materials that will enable their broader use and commercialization. Shape memory materials are advanced materials that can store a temporary shape and restore their original shape upon application of an external stimulus, such as heat and are most commonly used due to their light-weight, relatively higher strain recover-ability, easier tailorable properties and manufacturability .	 Cagri Ayranci	University of Alberta	\$191,716	\$60,000
2012/13	Infrastructure for Investigating the Link Between Chronic Oral Inflammation and Systemic Health	The RCP funded infrastructure is essential to the work by three investigators who will examine how long-term inflammation in the mouth affects the heart and brain. This research will result in new therapies to reduce the burden of oral and systemic diseases which affect over 90% of the world's population.	 Ava K. Chow  Maria Febbraio  Patrick Flood	University of Alberta	\$499,920	\$199,969
2012/13	ABOVE: An Array for Broad-band Observations of VLF/ELF Emissions	Using the RCP funded infrastructure, researchers will deploy an array of radio instruments across Western Canada to study a region of near-Earth space known as the radiation belts. This capitalizes on Western Canada's unique geography to complement recently-launched and future international space missions. The developed technology will serve as a basis for future spaceflight instrumentation.	 Christopher Cully	Univeristy of Calgary	\$697,173	\$253,444

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2012/13	Microbial Genomics and Evolutionary Cell Biology Suite	The new infrastructure will allow the Dacks lab at the University of Alberta to use genome sequencing to explore the range and diversity of cell biology to understand issues of health, the environment, and the origins of the human cell.	 Joel Bryan Dacks	University of Alberta	\$447,478	\$178,991
2012/13	Application to Establish a Neurovascular Translation Research Laboratory	The project infrastructure will equip a Translation Neurovascular Laboratory at the University of Alberta. The laboratory will carry out stroke and aneurysm studies in large animal models focusing on new treatments with the types of coils, stents, flow diverters and thrombus retrievers used in human medicine. Cerebral aneurysms, prevalent in approximately 2% of the population, are a significant cause of morbidity and mortality, causing death or permanent disability in up to 60% of patients when they rupture.	 Tim E. Darsaut  Cian O'Kelly	University of Alberta	\$399,636	\$159,854
2012/13	Knowledge Transfer and Utilization of Evidence-Based Psychosocial Treatments	The RCP funded infrastructure will provide for an innovative facility to develop, evaluate and disseminate evidence-based psychosocial treatments. The focus of the work is on standards for development and evaluation of treatments for mental health disorders, and their transfer into applied settings and utilization.	 Keith Dobson  David Hodgins  Candace Konnert	University of Calgary	\$378,407	\$151,363
2012/13	Infrastructure to Investigate Emerging Biological Threats in Canadian Boreal Forest Ecosystems and Integration with Chemical Ecology	The new infrastructure will enable the exploration of questions of broad relevance to the invasion of jack pine forests by the mountain pine beetle and climate change. Specifically, the program goal is to understand the biological and abiological factors affecting the invasion dynamic, such as tree resistance, competition or climate change, and to provide management opportunities for intervention where direct management is appropriate.	 Nadir Erbilgin	University of Alberta	\$227,485	\$90,994
2012/13	Millimeter-Wave Radio Facility	The infrastructure will establish a new facility that supports the development of low-energy consumption Gbps mm-wave radios for wireless and satellite communications. This facility will also be valuable to researchers using mmwave electronics to develop high-resolution imaging technologies for medical, remote sensing and security screening purposes and related applications.	 Fadhel Ghanouchi	University of Calgary	\$949,974	\$379,990

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2012/13	The Human DNA Repair and Chromatin Dynamics High Resolution Imaging Laboratory	The RCP funded grant will further the development of high-resolution microscopy capabilities at the Southern Alberta Cancer Research Institute and carry out research into how human cells respond to DNA damage caused by prevalent environmental carcinogens. Researchers will also develop practical methods for determining the sensitivity of Albertans to radiation or chemotherapy prior to treatment.	 Aaron Goodarzi	University of Calgary	\$374,695	\$149,877
2012/13	Multimedia Object Research Platform Host for Adaptive and Mobile Learning	The customized novel infrastructure provided by the RCP grant will enhance the technology-based learning environment at Athabasca University. The project will enable researchers to study the emerging structures of user-generated content and the dynamic interaction patterns of users for adaptive and personalized learning, in the context of desktop-based and mobile settings.	 Sabine Graf  Dragan Gasevic  Vivekanandan Kumar	Athabasca University	\$933,854	\$357,539
2012/13	Center for Pure and Applied Thermochronology (CPAT)	The project infrastructure will enable the development of Canada's first state-of-the-art low temperature, helium isotope, thermochronology center. This facility will focus on driving innovative thermal evolution and tracer research, impacting several key strategic research priority areas including: environment, energy, and carbon capture and storage.	 Bernard Guest  Andrew Leier  Stephen Larter	University of Calgary	\$1,271,983	\$508,793
2012/13	Characterization of Shale Gas and Shale Oil Reservoirs	The RCP funded infrastructure will develop integrated geological and petrophysical models for understanding and predicting reservoir performance in shale gas and shale oil reservoirs. The equipment complements existing infrastructure at the University of Alberta and is capable of measuring permeability down to 1 nanodarcy.	 Nicholas B. Harris	University of Alberta	\$364,055	\$120,000
2012/13	Research Supporting the Understanding of Infectious Disease Caused by Biofilms	The project infrastructure will support state-of-the-art research that seeks to understand the process of infectious disease caused by biofilms. Biofilms are slime-covered microbe communities that stick to each other and to surfaces; they account for many chronic infections that defeat the immune system and are highly resistant to antibiotic therapy.	 Joe Harrison	University of Calgary	\$687,084	\$272,828








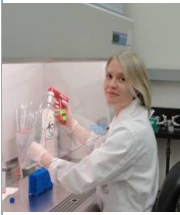
Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2012/13	Multinuclear NMR Facility for Multiphase Materials Science	The multinuclear NMR infrastructure will enable research in diverse fields of chemistry and neighbouring sciences by providing cutting-edge characterization tools for polymer science, catalyst research, fluorination methods, petrochemistry, biochemistry, agrochemistry, and neuroscience.	 Paul Hazendonk  Michael Gerken  Paul Hayes	University of Lethbridge	\$1,599,114	\$639,645
2012/13	Endocannabinoid Signaling as an Endogenous Regulator of Stress and Anxiety	The neural mechanisms through which stress influences vulnerability to mental illness are not well understood, but involve structural and functional reorganization of neural circuits in the brain. This project aims to understand how the endocannabinoid system regulates vulnerability and resilience to mood and anxiety disorders.	 Matt Hill	University of Calgary	\$809,710	\$323,884
2012/13	Digital Imaging of the Brain's Anatomy: Experimental and Comparative Approaches	The RCP funded infrastructure will enable the development of a unique, state-of-the-art digital imaging facility in Canada dedicated to understanding the anatomy of the brain. By using a high-resolution slide scanner, researchers can provide high resolution images throughout the entire brain, thus allowing other researchers to reanalyze and reinterpret experimental results.	 Andrew N. Iwaniuk	University of Lethbridge	\$329,062	\$131,634
2012/13	Cognitive and Neural Mechanisms of Language and Working Memory	The new infrastructure will provide state-of-the-art eye-tracking (ET) and electroencephalographic (EEG) recording systems that will be used to examine language and cognition in adults with and without brain impairments. This equipment will provide insight into the mental processing (ET) and brain regions (EEG) involved in language and working memory.	 Esther Kim  Jacqueline Cummine  Ada Leung	University of Alberta	\$121,227	\$40,000






Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2012/13	Translational Pathology Unit	To close the gap between discoveries and clinical application in diagnostics, the RCP funded equipment will complement existing infrastructure and form a state-of the art Translational Pathology Unit within the Li Ka Shing HRIV Centre at the University of Alberta.	 Michael Mengel  Judith Hugh	University of Alberta	\$463,087	\$185,236
2012/13	Protein Quality Control Analysis in Health and Disease	Aiming to achieve significant results in preventing, treating, and ending many protein folding disorders including Alzheimer's, Parkinsons, and others, the new infrastructure will enable the analysis of protein quality control in health and disease and the identification of protein binding partners and interacting molecules.	 Marek Michalak	University of Alberta	\$975,325	\$390,129
2012/13	Smart Power Distribution Grid Laboratory	The project will develop a Smart Electric Power Distribution System Research Facility at the University of Alberta. This new infrastructure will facilitate a powerful experimental setup needed to validate research results in the emerging area of renewable and clean energy systems.	 Yasser A.-R. I. Mohamed	University of Alberta	\$196,221	\$60,000
2012/13	Deciphering the Molecular Mechanism(s) of mRNA Export	DNA stores the instructions governing life, which must be shared with the rest of the cell. Failure to properly share this information has disastrous consequences including the onset of various human diseases. This project will study how such a change in information flow contributes to human diseases such as cancer, motor neuron syndromes, and sudden early cardiac arrest.	 Ben Montpetit	University of Alberta	\$450,000	\$180,000
2012/13	An Image-Guided Small-Animal Irradiation Facility for Precise Targeted Delivery of X-Rays to Specific Regions of Tumors and Normal Tissues	"Image-guided" radiation therapy (IG-RT) is one of the innovative new treatments available to cancer patients. The RCP funded infrastructure will enable, for the first time, preclinical assessment and investigation into dosing and combination therapies for IG-RT. These studies could provide improved outcomes for cancer patients and cost saving for the healthcare system.	 David Murray	University of Alberta	\$816,204	\$326,241
2012/13	Quantitative High Speed Stereo Video-Fractography System	New materials development is reliant upon understanding failure, and its circumvention. The RCP funded infrastructure will build a high speed camera system to capture, and measure, never before seen failure events in materials research. Subsequent research projects may enhance current collaborations between Alberta Innovates and Campus Alberta in an effort to develop, build, and diversify the economy.	 John A. Nychka	University of Alberta	\$315,592	\$125,000

Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2012/13	Laboratory for Novel Vascular Anti-Inflammatory Therapies	The new infrastructure will support the development of the Laboratory for Novel Vascular Anti-Inflammatory Therapies where the development and treatment of vascular diseases as atherosclerosis are investigated. These studies will be carried out in conjunction with critical biochemical analyses performed in the adjacent MacDonald laboratory, and are aimed at discovering improved methodologies to predict and treat premature and "silent" blood vessel inflammation in young Canadian adults.	 Ed O'Brien	University of Calgary	\$984,318	\$393,727
2012/13	Aquatic Conservation and Fisheries Management Research Laboratory	The RCP funded infrastructure will create a new Aquatic Conservation and Fisheries Management Laboratory at the University of Alberta. The laboratory will engage in research on the conservation and restoration of aquatic ecosystems including the capture and measurement of aquatic organisms, analysis of age and growth relationships, measurement of environmental conditions, and field research.	 Mark Poesch	University of Alberta	\$339,090	\$135,000
2012/13	EEG Laboratory for the Study of Neural Network Reorganization	The state-of-the-art EEG and imaging analysis laboratory at the University of Calgary will be used to identify phenomena that characterize individual differences in functional resilience, and the capacity to predict the optimal treatment for individuals with brain disorders such as epilepsy and depression.	 Andrea Protzner	University of Calgary	\$237,675	\$95,070
2012/13	Development of an Infrastructure for the Investigation of New Technologies for Traffic and Transportation Applications	Congestion, fatalities and injuries due to accidents, emissions, and air pollution are all consequences of higher urban and rural travel demands. The new infrastructure will create two testbeds located in Edmonton (one along outer ring road, Anthony Henday Drive, and another along two main arteries, Whitemud Drive and Yellowhead Trail) and a traffic data centre at the University of Alberta. These facilities will develop and evaluate new traffic monitoring and management technologies.	 Zhi-Jun Qiu	University of Alberta	\$329,928	\$126,311
2012/13	A Slimline Borehole Seismic System for Geophysical Imaging and Monitoring of Induced Seismicity: Applications in Scientific Drilling, Mine Safety, Carbon Sequestration, and Hydrocarbon Extraction	The Slimline Borehole Seismic System infrastructure at the University of Alberta will allow researchers to obtain both active and passive seismic data at depth in the earth. The data will be used in numerous different drilling applications both in Alberta and globally to assist in the development of geothermal energy, conventional and unconventional hydrocarbon resources, minerals, and carbon sequestration.	 Douglas R. Schmitt	University of Alberta	\$833,309	\$325,000
2012/13	Facility for Functional Genomic Analysis of Oncolytic Viruses (FGOV)	Viruses that selectively seek and destroy cancer cells provide innovative candidates for cancer therapy. RCP funded infrastructure at the Facility for Functional Genomic Analysis of Oncolytic Viruses (FGOV) will apply the latest genomic approaches to reveal new cellular and viral genes that can be fine-tuned to improve the therapeutic efficacy of cancer-killing viruses.	 Maya Shmulevitz	University of Alberta	\$441,382	\$176,553

Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2012/13	Laser Illumination, Photo-Bleaching and Nano-Positioning Systems to Facilitate Live-Cell Imaging of Biomolecule Regulation	The new infrastructure will update and enhance the live-cell imaging instrumentation used in a large number of collaborating laboratories at the University of Alberta. This enhancement will enable the development of technology that will provide new abilities to study the basic pathways of mRNA regulation linked to multiple diseases.	 Andrew J Simmonds	University of Alberta	\$252,853	\$101,141
2012/13	Low Stress Animal Behavioral Suite for Investigation of Neuropathic Pain and Other Neurological Disease	The RCP funded infrastructure will establish and equip a state-of-the-art animal behavioral suite at the University of Alberta. The unique organization of this facility will provide an unprecedented level of information pertinent to the treatment of chronic pain, multiple sclerosis and other neurological diseases. The facility is expected to increase both academic and industrial research investment in Alberta.	 Peter A. Smith	University of Alberta	\$401,383	\$160,553
2012/13	Infrastructure to Develop a Clinical Cardiopulmonary Physiology Laboratory to Examine the Cardiovascular Consequences of Chronic Obstructive Pulmonary Disease	The new infrastructure will be used to develop a clinical research laboratory examining cardiovascular diseases in patients with chronic lung disease. The work will look at the mechanisms that may explain why patients with lung disease develop cardiovascular disease, as well as the impact of possible treatments.	 Michael K. Stickland	University of Alberta	\$878,715	\$351,486
2012/13	Analysis of Intracellular Protein Trafficking and Organelle Biogenesis	The Wozniak, Rachubinski, and Melançon laboratories study the structure and biogenesis of cellular membranes and organelles and focus on analysis of the nuclear envelope membrane, peroxisomes and the Golgi complex. Defects in each of these membrane systems can have catastrophic health consequences, including developmental and neurological disorders, cancer and heart disease. The new infrastructure will enable cell biological experiments that cannot be performed with the current instrumentation.	 Richard Wozniak  Paul Melançon  Richard Rachubinski	University of Alberta	\$832,540	\$333,016
2012/13	Integrated Photonics	The RCP funded infrastructure will facilitate a research-driven technology development program to design, prototype, and test sensors with better performance and more functionality by designing light sources and optical filters that can be integrated on microchips. Miniaturization of these systems would significantly increase their utility in the field (e.g., gas detection in oil drilling; CO2 detection) and clinics (e.g., skin cancer detection) as part of a portable hand-held sensor tool kit.	 Orly Yadid-Pecht	University of Calgary	\$272,281	\$100,000

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2012/13	Understanding the Multiple Sclerosis Disease Process at the Mind-Molecule Interface	Muscular dystrophies (MD) are a group of more than 30 genetic diseases characterized by progressive weakness and degeneration of skeletal muscle. The new research infrastructure will be used to focus on identifying molecular therapies for MD, especially in the promising field of antisense-mediated exon-skipping. This approach is unique in Canada and will aid in designing the best strategy of molecular therapy for MD.	 Toshifumi Yokota	University of Alberta	\$798,015	\$319,206
2011/12	Preparative Biochemistry Suite for the Study of the Ribosome as a Biomolecular Nanomachine	A detailed understanding of the dynamic properties and mechanisms inherent to the processes taking place in ribonucleoprotein assemblies will strongly contribute to unraveling the underlying design principles of biomolecular nanomachines and will further the development of biomolecular engineering. This infrastructure will allow Dr. Wieden to study the mechanistic details and the functional and structural principles underlying protein synthesis.	 Hans-Joachim Wieden	University of Lethbridge	\$374,424	\$149,766
2011/12	Tools for Studying Neural Systems with Optogenetic and Electrophysiological Techniques	Optogenetics is an innovative technology for controlling the activity of specific neurons with light. In association with the Canadian Centre for Behavioural Neuroscience, Dr. Gruber will use optogenetic techniques to conduct experiments in behavioural neuroscience by combining optogenetics with state-of-the-art methods for monitoring neural activity to observe and manipulate brain function.	 Aaron Gruber	University of Lethbridge	\$368,598	\$147,439
2011/12	Quantum Nanophotonics Laboratory (QNL)	The Quantum Nanophotonics Laboratory will house the world's most advanced system for probing nanoscale optical devices at low temperature, in order to study nanostructures embedded with a quantum optical system. Dr. Barclay's collaboration with the National Institute for Nanotechnology has the potential to increase the efficiency and capacity of sensing and computing technology, such as increased internet bandwidth and improved environmental scanning.	 Paul Barclay	University of Calgary	\$725,143	\$290,057
2011/12	Instrumentation for Prospective Identification, Single-Cell Sorting and High-Resolution Imaging of Multipotent Dermal Stem Cells	The hair follicle, with its unique regenerative capacity and highly accessible location, is an ideal model system to study the mechanisms regulating adult stem cell behavior, tissue regeneration, and the potential therapeutic use for skin. By studying hair follicle stem cells Dr. Biernaskie aims to develop stem cell-based strategies to improve wound healing and tissue regeneration.	 Jeffrey Biernaskie	University of Calgary	\$736,621	\$275,074
2011/12	Fluid-Flow Characterization of Unconventional Reservoirs	This infrastructure will enable Dr. Clarkson to describe and classify unconventional geological structures holding oil and gas resources and the flow of those resources when they are freed, as well as to develop techniques to extend lab developments into field testing. The new knowledge will help explore the potential to use the injection of carbon dioxide in unconventional reservoirs, enhance hydrocarbon recovery and reduce greenhouse gas emissions, thereby contributing to assessments for economic potential and resource evaluation for carbon capture and storage.	 Christopher Clarkson	University of Calgary	\$316,055	\$126,422

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2011/12	Two-Photon Imaging of Cerebral Blood Flow: From Cells and Veaving Animals	Dr. Gordon's research focuses on understanding the cellular mechanisms responsible for cerebral blood flow, providing insights with the potential to advance our treatment of related conditions such as stroke, vascular dementia, cognitive decline, Alzheimer's and migraine. Complementary to the Hotchkiss Brain Institute's Cerebral Circulation research area, this equipment will enhance the capacity to increase the transfer of laboratory results to clinical practice and drug development.	 Grant Gordon	University of Calgary	\$752,427	\$300,970
2011/12	Infrastructure Resources to Allow the Application of Zebrafish Genetics to Understand Neural and Vascular Development	Drs. Kurrasch and Childs will explore zebrafish genetics to identify genes and gene networks involved in human neural and vascular diseases such as precocious puberty, obesity and genetic stroke and aneurysm disorders. Potential long-term outcomes include the discovery of potential biomarkers to identify at-risk children for endocrine diseases and the commercialization of related diagnostic tests.	 Deborah Kurrasch  Sarah Childs	University of Calgary	\$704,297	\$245,720
2011/12	Experimental Facilities for the New Unsteady Fluid Mechanics Laboratory	Unique to Canada, the Unsteady Fluid Mechanics Laboratory will focus on accelerating the deployment of new renewable-energy technologies in Alberta. Among other future clean-energy technologies, the facility will produce state-of-the-art, laser-based measurement techniques which will improve the understanding of current wind- and water-turbine flow fields and lead to more efficient and cost-effective designs.	 David Rival  Robert Martinuzzi  David Wood	University of Calgary	\$299,679	\$119,871
2011/12	Generation of an Environmental Genomics System to Study the Evolutionary Consequences of Environmental Change in Canadian Freshwater Fishes	Dr. Rogers' research is at the forefront of environmental genomics, an emerging field that seeks to predict how organisms will respond, at the genetic level, to changes in the external environment. The long-term objective is to understand how ecology and evolution influence genetic variation in natural populations of freshwater fish, enabling organisms to respond to environmental change.	 Sean Rogers	University of Calgary	\$574,726	\$229,853
2011/12	Microscopy Tools for the Study of Uterine Smooth Muscle Function in Human Pre-Term Labour	Pre-term labour occurs in 10% of all births and is the leading cause of neonatal mortality and morbidity in Canada, with the highest incidence of occurrence in Alberta. Through collaborations with clinician scientists in obstetrics and gynecology, the primary focus of Dr. Slater's research is to understand the basic underlying mechanisms controlling the onset of human labour and to improve the prediction and treatment of premature labour.	 Donna Slater	University of Calgary	\$274,985	\$109,994










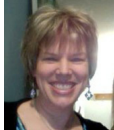
Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2011/12	Viscoelastic Materials Characterization for Novel Highly Conductive Polymer Blends/ Nanocomposites and Heavy Oils	The infrastructure will develop novel materials for oil recovery technologies and provide a greater understanding of the flow of heavy oils. The technology and tools for this characterization of materials may also uncover novel advanced materials for energy, electronics and health sectors. The research program will provide training opportunities in nanotechnology, materials science, polymer processing and new oil field applications.	 Uttandaraman Sundararaj	University of Calgary	\$557,300	\$222,920
2011/12	Dissection of Wood Cell Wall Chemistry and Aquaporin Location Using Confocal Microscopy	Climate change is considered to be a major challenge for the future management and conservation of the boreal forest. This research will help us better understand how trees cope with environmental stress, particularly drought and freeze-thaw cycles, and is an important step toward introducing drought-resistant species into the landscape. Additionally, this work will contribute to diversifying fiber products and enhancing the potential to establish fast-growing trees on marginal agricultural land.	 Uwe Hacke	University of Alberta	\$160,250	\$64,100
2011/12	An Ultra-Sensitive Device for Measuring and Imaging Trace Radioactive Impurities in Materials for Dark Matter Searches	Housed in the Centennial Centre for Interdisciplinary Science, the BetaCage instrument provides ultra-pure materials and instrumental sensitivity to identify trace elements in samples – services that are essential to the continued development of a world-class centre that can serve the needs of international researchers. For example, this equipment will provide a distinct advantage for the new projects at SNOLAB, the world's premier deep underground laboratory with research focused on neutrino physics and Dark Matter searches.	 Darren Grant	University of Alberta	\$299,999	\$120,000
2011/12	Laboratory for Monitoring the Pathogenic Potential of Environmental Bacterial Populations	The identification of genes likely to play a role in the emergence of pathogenic strains, monitoring their dispersal in nature, and describing the interactions between existing and emerging pathogens in the environment are essential to allowing us to better predict and track potential outbreaks or epidemics. This facility will help Dr. Boucher's research program to detect the spread of human pathogens across the globe through molecular diagnostics.	 Yan Boucher	University of Alberta	\$262,524	\$100,000
2011/12	Defining New Roles for Bcl-2 Family Members in Breast Cancer: Implications for Improved Treatment Options and Novel Therapies	The infrastructure will allow Dr. Goping to investigate breast cancer with a focus on developing new targeted therapies, and will be instrumental in efforts to develop more personalized treatment plans for cancer. These studies will be used to develop diagnostic tools that will guide the discovery and development of treatment and drug regimes.	 Ing Swie Goping	University of Alberta	\$481,435	\$192,574
2011/12	Creation of a Laboratory to Study the Role of the Hsp90 Chaperone in Cancer	Building on existing strengths in cancer research, this project is aimed at characterizing and exploiting molecular changes that occur very early in the development of cancer. This knowledge will make diagnostic and therapeutic advances possible for the treatment of not only cancer, but also cystic fibrosis, diabetes, and neurodegenerative and age-related diseases.	 Paul LaPointe	University of Alberta	\$833,075	\$59,358

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2011/12	Laboratory for Investigation of Spatiotemporal Molecular Gradients in Biological Systems: Screening Infrastructure for Dynamic Molecular Tools, Materials, and Synthetic Extracellular Environments	Housed in the Centennial Centre for Interdisciplinary Science, and bringing a translational component to the Alberta Innovates Centre for Carbohydrate Science, the infrastructure will enable advanced investigation of membrane components, protein engineering and synthetic biology. The equipment will enable Dr. Derda to develop chemical tools to tackle biological responses and translational research of use to pharmaceutical and biomedical industries.	 Ratmir Derda	University of Alberta	\$572,396	\$228,958
2011/12	Infrastructure for Telerobotic and Biorobotic Systems Laboratory (TBSL)	The Telerobotic and Biorobotic Systems Lab will increase the acceptance of robotic/telerobotic assistance as the preferred approach to minimally invasive operations and cardiac surgery/telesurgery, rehabilitation/tele-rehabilitation, and percutaneous cancer therapy and enable operating through several small incisions in the body, thus reducing patient morbidity and the length of hospital stay compared to open surgery.	 Mahdi Tavakoli	University of Alberta	\$446,806	\$170,000
2011/12	Advanced Analytical Facility for Environmental Soil Research	Addressing important environmental issues such as land reclamation and ground water contamination associated with the oil sands and petroleum industries, the research of Drs. Siddique and Dyck will assist in the development of science-based management systems to protect our natural resources and will provide the fundamental knowledge required to devise better strategies for sustainable in-situ clean-up and management of contaminated sites in Canada.	 Tariq Siddique  Miles Dyck	University of Alberta	\$555,024	\$216,460
2011/12	Soil, Water, Air, Manure, Plant (SWAMP) Lab: Analytical Infrastructure for Studying Trace Element Cycling at Interfaces	Potentially toxic trace metals released to the environment from human activities can cause considerable environmental damage and ultimately impact human health. The SWAMP lab will house leading-edge equipment to aid the development of new environmental indicators and allow us to understand trends in environmental contamination. The research results will help to develop processes and policies with regard to water management, safe and secure drinking water, healthy aquatic ecosystems and reliable, quality water supplies.	 William Shotyk	University of Alberta	\$2,000,000	\$800,000
2011/12	Capacity Building in Vision Research to Prevent Blindness	Vision loss causes a profound sense of despair and disability and creates long-term costs for society and a poorer quality of life. The research of Drs. MacDonald, Lehmann and Sauve aims to improve the vision health and well-being of Albertans. This infrastructure will build on international research excellence in ocular genetics, providing an opportunity to undertake innovative gene therapy research protocols. It will also build capacity for basic vision research and future innovative clinical trials to prevent blindness.	 Ian MacDonald  Ordan Lehmann  Yves Sauve	University of Alberta	\$467,117	\$186,846

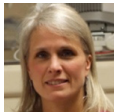


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2011/12	Innate and Adaptive Killer Lymphocyte Responses	Viruses and cancer are significant causes of morbidity and mortality in Alberta and Canada. Development of effective immune system-based therapies and vaccines to prevent or counter infections and cancers are dependent on having an in-depth understanding of the molecular interactions controlling immune responses. Dr. Kane's research explores the contributions of subsets of lymphocyte cells in host defenses against infections and cancer.	 Kevin Kane	University of Alberta	\$971,485	\$388,594
2011/12	The Role and Discovery of Bioactive Small Molecules from Marine Microbial Communities	The marine environment is thought to be one of the richest sources of natural products. A range of antibacterial, antiviral, anticancer and antifungal compounds have been isolated from both marine animals and plants. Dr. Case's laboratory aims to study these bioactive compounds at both the cellular and community levels. These compounds could be developed as a range of commercial products including antibiotics, antifouling treatments and biofuel processing.	 Rebecca Case	University of Alberta	\$250,301	\$100,000
2011/12	Research Infrastructure for the Characterization of Interfacial Properties, Intermolecular and Surface Interactions in Soft Materials, Nanomaterials and Biological Systems	"Dr. Zeng's research team is interested in developing novel polymeric materials, thin films and surfaces with extreme adhesion capability in dry and wet environments, a self-healing ability, and anti-fouling properties. This state-of-the-art atomic force microscope will be used to characterize advanced polymeric materials, nanomaterials, biomaterials and complex fluid systems with potential applications for oilsands pipelines, tailings water treatment and waste treatment.	 Hongbo Zeng	University of Alberta	\$279,010	\$100,000
2011/12	Lipid Metabolic Disorders	Obesity is a serious health problem in Canada, putting individuals at risk for numerous medical conditions including cardiovascular disease, hypertension, type 2 diabetes and Alzheimer disease. This infrastructure will ensure the continuation of important work on the identification of new biomarkers and pharmacological targets to improve these disorders and continue ground breaking research into discoveries and translation of the results into effective therapeutic applications.	 Richard Lehner	University of Alberta	\$990,393	\$396,157
2011/12	Innovative Research Infrastructure to Propel Implementation and Evaluation of Comprehensive School Health	The Population Health Intervention Research Unit focuses on the importance of healthy eating and active living in childhood, in part through developing school programs to prevent chronic diseases. The infrastructure will allow program evaluation and enable new research results to be tested and translated back to programming in participating schools and the public at large. The program will also be expanded into more remote and rural schools, including Northern, First Nations and Métis communities.	 Paul Veugelers	University of Alberta	\$456,606	\$175,399
2011/12	SuperResolution Imaging of Virus/Host Interactions	Ribonucleic acid viruses, such as influenza and hepatitis C, cause the majority of virus-associated acute and chronic disease in humans, which have few treatment options, other than a limited number of vaccines. This new technology is poised to revolutionize our ability to view subcellular structures in 3D and will enhance our understanding of how they function, and how viruses disrupt their function. Through these studies we hope to devise strategies to block virus replication by interfering with their ability to take advantage of host cells.	 Tom Hobman	University of Alberta	\$1,000,000	\$400,000





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2011/12	Preterm Birth: Prediction, Prevention and Technology Commercialization	The infrastructure will allow Drs. Olson and Mitchell to develop technologies to predict pregnant women at risk of preterm birth (PTB), to discover new disease mechanisms, and to test new treatments to delay PTB, prolong pregnancy and improve maternal health. The new treatments resulting from this research program have strong commercial potential.	 David Olson  Bryan Mitchell	University of Alberta	\$729,105	\$291,642
2011/12	Integrated Field and Laboratory Infrastructure for the Development and Characterization of Road Materials and Pavement Performance for Cold Regions	Dr. Bayat will establish integrated field and laboratory infrastructure to better understand the effects of cold climate factors on pavement materials and the performance, characterization and evaluation of recycled and waste materials for use in road construction. The research is aimed at developing sustainable practices and materials for road construction and creating value-added applications for recycled and waste materials, thereby increasing the lifespan and performance of pavements while reducing spending on road maintenance and waste material.	 Alireza Bayat	University of Alberta	\$637,357	\$254,753
2011/12	Holocene Archaeology of North-east Asia	The Baikal Archaeology Project (BAP), which focuses on the human-environment interactions of the Holocene Hunter-Gatherers in Northeast Asia, is comprised of a multidisciplinary team of scholars with expertise in archaeology, anthropology, geochemistry, molecular biology, geophysics and environmental reconstruction. The BAP team is internationally recognized, works with collaborators of the highest caliber and represents a top priority in the University of Alberta's internationalization strategy. The technological innovation of the program includes the creation of digital archives to ensure long-term virtual access for the international academic community and the public.	 Andrzej Weber  Fiona Bamforth  Robert Losey	University of Alberta	\$1,984,831	\$793,932
2011/12	Molecular Biology Laboratory for the Study of Metabolic Disorders	Dr. Jacobs' research program seeks to understand the complex interactions involved in chronic metabolic disorders. His work is focused on understanding the cellular, biochemical, genetic and epigenetic mechanisms through which nutrition influences the development of obesity, dyslipidemia and insulin resistance. The Molecular Biology Laboratory supports research to determine which nutritional, surgical or pharmaceutical approaches could be used to improve or prevent these metabolic disorders.	 René Jacobs	University of Alberta	\$413,454	\$165,382




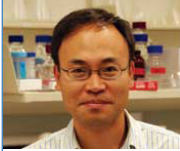



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2011/12	Canada's Arctic Cratons, Kimberlites and Diamonds	"The infrastructure will bring the first multi-ion counting TIMS instrumentation to Canada and will open up new fields of geochemistry. This research will produce important results on exploration samples, allowing early targeting of potential deposits. These and other data will be integrated into Dr. Pearson's Canada Excellence Research Chair research program objective to produce a 4-D model of Canada's Arctic mantle that will aid not only diamond exploration, but also the search for metals and oils."	 Graham Pearson  Thomas Stachel  Larry Heaman	University of Alberta	\$2,000,000	\$800,000
2011/12	Development of Tools and Techniques for Physical and Chemical Characterization of Oil Sand Interfaces	Dr. Thundat, the Canada Excellence Research Chair in Oil Sands Molecular Engineering, will develop a suite of instruments and techniques for understanding and controlling fundamental processes occurring at the interfaces between fluids and solids in the oil sands. Manipulation of these interactions, combined with sensors to continuously detect surface composition, will enable the development of improved, environmentally friendly and cost-effective techniques for extraction, upgrading and reclamation of tailings.	 Thomas Thundat	University of Alberta	\$2,000,000	\$800,000
2010/11	Electron Paramagnetic Resonance Spectroscopy Facility for Nanomaterials and Advanced Catalysis	The research equipment purchased with this award will allow Drs. Rene Boéré and Paul Hayes to uncover novel nanomaterials and advanced catalysis and provide scientific instrumentation that presently does not exist in Canada. The research may lead to improved drug development, materials synthesis, and the production of value added chemicals.	 Rene Boéré  Paul Hayes	University of Lethbridge	\$441,105	\$176,004
2010/11	The brain in action: A research facility for the study of sensory and motor integration in healthy and neurological populations	The award will help support the creation of a research facility to study sensorimotor functions in healthy and neurological populations. The research supported by this award may lead to improved diagnosis and treatment of common neurological disorders such as stroke, Parkinson's disease and epilepsy.	 Claudia Gonzalez	University of Lethbridge	\$244,712	\$97,885
2010/11	Molecular characterization of disease mechanisms involved in genetically determined cardiomyopathies	This award will support the purchase of equipment that will enable Dr. Brenda Gerull to further understand the novel genetic factors influencing cardiovascular disease. The equipment and research will also provide valuable opportunities for students to advance their knowledge of cardiovascular disease aetiology, provide training for students in advanced scientific methods and, ultimately, to improvements in healthcare.	 Brenda Gerull	University of Calgary	\$617,167	\$246,866
2010/11	Steroid hormone sample preparation and mass spectrometry laboratory	The equipment supported by this award will be used to investigate the body's responses to steroid hormones. Dr. Wynne-Edwards laboratory will be a powerful tool in improving our fundamental understanding of individual responses to both chronic and acute stress, leading to reduced chronic disease, improved mental health, and healthier children at birth.	 Katherine Wynne-Edwards	University of Calgary	\$999,950	\$299,598

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2010/11	Fluorometric instrumentation for the measurement of sub-cellular microenvironments	This award will provide Dr. Yates with the required equipment to further advance the field of cell biology research in Alberta. The capabilities of new equipment will also be important to support Alberta's research initiatives in the areas of fundamental biology of immune cells, disease states and the invention and advancement of research tools.	 Robin Yates	University of Calgary	\$650,935	\$227,923
2010/11	Translational Health Research Collaboratorium	The award will support the development of a custom database for a network of clinical and social scientists with common goal of conducting world class translational health research. Drs. Kaplan, Saunders and Coffin's Collaboratorium will be a powerful tool in designing future programs for the treatment and prevention of gastrointestinal and hepatology diseases.	 Gilaad Kaplan  Chad Saunders  Carla Coffin	University of Calgary	\$438,481	\$175,393
2010/11	Mechanotransduction in cardiovascular tissues: role of residual stresses explored by real-time in situ microscopy coupled with biomechanical measurements	This award will support the purchase of equipment that will enable Dr. Di Martino to investigate how changes in the structure and function of the components of blood vessels and heart tissues can lead to serious cardio-vascular ailments. The findings from preliminary research may lead to further developments in novel treatment options for these diseases.	 Elena Di Martino	University of Calgary	\$297,389	\$81,240
2010/11	Open Social Mobile Systems for eLearning Research (OSMoSYS)	Drs. Dron and McGreal will combine their expertise in open social mobile systems to develop four synergistic components that researchers at Athabasca University believe characterize the next generation of educational technology systems; Open (free) content, Social networking, Mobile devices and ubiquitous (sensor based) triggers to learning opportunities.	 Jon Dron  Rory McGreal	Athabasca University	\$951,305	\$346,152
2010/11	High-content functional genomic analysis of immune responses	The award supports the purchase of specialized equipment for Dr. Foley's research program to study genomics and cell biology. The new equipment is essential for his team to observe novel immune responses and will complement the facilities already available at the University of Alberta's high-content imaging systems for cell culture.	 Edan Foley	University of Alberta	\$838,247	\$295,299
2010/11	Molecular microbiology laboratory for ecology and physiology (M2LEAP)	This award will help Drs. Lanoil and Stein establish a laboratories is to understand the structure and function of organisms behind the production and consumption of greenhouse gasses. The researchers will investigate how greenhouse gasses may be regulated by microbial activity and the associated climate change impact. The presence of this infrastructure will establish the laboratory as the centre for environmental microbial ecology and physiology in Canada.	 Brian Lanoil  Lisa Stein	University of Alberta	\$528,869	\$206,000

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2010/11	Mass Spectrometry for the Analysis of High Molecular Weight Protein Complexes	The award will purchase leading-edge mass spectrometry (MS)-based tools to characterize biologically important high molecular weight proteins and protein complexes. Dr. Klassen's laboratory will provide powerful tools in the discovery and development of novel strategies for the treatment of a variety of diseases and microbial infections which will lead to the development and commercialization of new drugs.	 John Klassen	University of Alberta	\$1,099,717	\$439,887
2010/11	The Last Best West: The Alberta Land Settlement Infrastructure Project	This award will support the equipment to enable Drs. Baskerville, Carter and Gouglas to develop a Alberta land settlement database. The combination of geo-physical, census and Homestead data creates a unique infrastructure for understanding early land use in Alberta. The data will be important to support Alberta's research initiatives in the areas of natural resources and land management.	 Peter Baskerville  Sarah Carter  Sean Gouglas	University of Alberta	\$984,505	\$393,802
2010/11	Facility for the Fundamental Characterization and Application of Advanced Materials	Dr. Serpe's research will investigate polymeric materials, metal/inorganic nanoparticles, and polymer/nanoparticle hybrid materials in the development of advanced materials. The research supported by this award may lead to materials for a variety of industrial uses such as improved surface coatings for lubrication, ultrasensitive biosensing/spectroscopic techniques, antibacterial polymeric coatings, and photonic materials.	 Michael Serpe	University of Alberta	\$370,369	\$128,000
2010/11	Multiparametric Flow Cytometry System for the Development and Characterization of Environmental Biotechnology Remediation Strategies	Equipment purchased with this award will be used for the development and characterization of microorganisms used to degrade contaminants into non-harmful end products. Dr. Ulrich will investigate several research areas such as removing pharmaceuticals and nanomaterials in drinking water systems and greenhouse gases from the oil sands industry.	 Ania Ulrich	University of Alberta	\$334,294	\$125,000
2010/11	Small animal PET/CT: An innovative preclinical multimodality molecular imaging platform for translational research	The infrastructure supported by this award will augment Dr. Wuest's research by equipping his team with the technology to extend their innovative translational cancer research program. Molecular imaging in living subjects offers distinct advantages when compared with conventional in vitro and cell culture research techniques. His research may lead to a faster diagnosis of the disease and more effective treatments.	 Frank Wuest	University of Alberta	\$1,974,632	\$789,853
2010/11	The Alberta Dialysis Databank (ADD)	The equipment purchased with this award will enable the development of an innovative databank, recording hemodialysis treatment strategies and outcome data from all patients treated in Alberta. Dr. Tonelli's laboratory will be a powerful tool in designing future programs for the treatment and prevention of kidney failure. The databank is also expected to lead to the discovery of new therapeutic technologies.	 Marcello Tonelli	University of Alberta	\$1,559,115	\$623,646

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2010/11	State-of-the-Art Ultrasound Bio-microscope for the Evaluation of Myocardial & Vascular Function in Maternal, Fetal and Placental Disease in Small Animals	The award will support in vivo ultrasound biomicroscope technology to explore fetal cardiovascular and pulmonary vascular development. A better understanding of myocardial and vascular functions may lead to new treatments for heart disease and to new therapeutic fetal and neonatal cardiovascular diseases and preventative strategies.	 Lisa Hornberger  Sandra Davidge  Bernard Thébaud	University of Alberta	\$597,997	\$239,199
2010/11	Facility to Support the Bench-to-bedside Development of Targeted Drugs and Drug Delivery Systems for Improved Therapeutic Performance	The award supports research in the development of new drugs and drug delivery systems. The results of Drs. Lavasanifar, Kaur and Uludag's research may help us to develop better therapeutic vaccines to treat cancer, engineered biopolymers that deliver mediators of bone growth and/or bone-regeneration in osteoarthritis and new agents for the prevention and treatment of hepatitis C.	 Afsaneh Lavasanifar  Kamaljit Kaur  Hasan Uludag	University of Alberta	\$944,034	\$377,614
2010/11	Electrophysiological Imaging and Photostimulation of Neuron-Glia Networks in Ex Vivo Neurological Disease Models	The imaging equipment purchased with this award will be used to develop novel pharmacological strategies for treatment of neurological diseases. The results of Drs. Ballanyi, Smith and Todd's research may help us to develop better treatments for disorder or injury of the brain, spinal cord or nervous system.	 Klaus Ballanyi  Peter Smith  Kathryn Todd	University of Alberta	\$1,990,927	\$796,371
2010/11	Oxidative Stress and Stress Signaling Facility	The facility, established with the support of this award, will allow Dr. Koltz to conduct innovative research in the field of drug safety and risk assessment. The facility will also support cutting edge research on understanding drug side effects based on oxidative stress.	 Lars Klotz	University of Alberta	\$452,796	\$181,118

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2010/11	An aquatic center for the evaluation of the effects of water quality on fish health	Dr. Tierney will use the Infrastructure for environment-animal interaction research for the evaluation of the effects of water quality on fish health. The equipment is essential to determine how changes in water flow, water quality (e.g. temperature, salinity, sediment load and dissolved contaminants) affect diverse fish species.	 Keith Tierney	University of Alberta	\$200,505	\$80,000
2010/11	Facility for the Experimental Characterization of Metamaterial Imaging Devices, Radiating Structures, and Scattering Surfaces	Dr. Iyer's research seeks to develop new directions in classical areas of electromagnetics and RF/microwave engineering, but is centered around the study of 'metamaterial' technologies. Metamaterials are artificial materials engineered to have properties that may not be found in nature and may have many diverse applications in ICT, aerospace, solar power, and invisibility-cloaking to name a few. The new laboratory will also be important to support Alberta's research initiatives in the area of applied electromagnetics research.	 Ashwin Iyer	University of Alberta	\$611,985	\$240,000
2010/11	Microparticle Engineering Facility	This award will support the equipment needed to establish a facility, necessary to advance Dr. Vehring's research program in the field of particle engineering. Structured microparticles have significant commercial potential, several development programs for respiratory therapeutics are underway. The research may also enable a variety of novel products in the pharmaceutical, biotechnology, and food industries.	 Reinhard Vehring	University of Alberta	\$536,716	\$200,000
2010/11	Ion homeostasis - from bench to bedside	Drs. Alexander, Casey and Cordat will use the award to purchase the equipment required to understand the fundamental molecular mechanisms behind many of diseases including disorders of the kidney, heart and eye. A better understanding of ion homeostasis may lead to new treatments for these disease and to new therapeutic strategies.	 Robert Todd Alexander  Joseph Casey  Emmanuelle Cordat	University of Alberta	\$726,973	\$290,786
2010/11	A hyperspectral infrared imaging facility for the non destructive spectroscopic scanning of geological core	Equipment purchased will further the study of spectral analysis and digital imaging of sediments for mineral exploration. The capabilities of Dr. Rivard's new laboratory will be important to support Alberta's research initiatives in the area of natural resource development including oil sands exploration recovery and processing, while mitigating environmental impacts.	 Benoit Rivard	University of Alberta	\$381,618	\$152,647

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2009/10	A Scaleable Optical Sensor Network for Ecosystem Health	Equipment purchased will be used to implement a network of optical monitoring and remote sensing devices to detect changes in ecosystems, such as forests, cropland, or rangeland. The project will gather extensive and integrated environmental data in a cost-effective way, while providing essential information for the sustainable management of Alberta's resources.	 John Gamon	University of Alberta	\$266,703	\$100,000
2009/10	Infrastructure for Understanding the Molecular Basis and Treatment of Cardiac Arrhythmias	The award supports cardiovascular research and the development of new anti-arrhythmic drugs, which would help regulate abnormal heart rhythms. The research will provide fundamental knowledge necessary for developing new, cost-efficient, and more effective therapies for the treatment and prevention of cardiac arrhythmia and sudden death.	 S.R. Wayne Chen	University of Calgary	\$988,797	\$395,519
2009/10	Ultrapformance Liquid Chromatography - Mass Spectrometry Facility for Plant Bioproducts Analysis	The award will purchase equipment to bolster research in plant metabolism. The equipment will enable the researchers to reliably identify and measure important compounds made by plants that could have applications in pharmaceuticals, flavours, fragrances, insecticides, and other chemical formulations.	 Peter Facchini  Dae-Kyun Ro	University of Calgary	\$1,076,348	\$430,540
2009/10	Advanced Laboratory for Ubiquitous Sensor Network	Equipment purchased with this award will be used to establish a network of self-sustaining (autonomous) sensors to monitor various environments, including agricultural areas and oil and gas fields. The equipment and research will also provide valuable training opportunities to students interested in developing wireless sensor network technology and data analysis skills.	 Henry Leung	University of Calgary	\$980,825	\$392,331
2009/10	Molecular Enzymology Laboratory	Equipment purchased will further the study of enzyme kinetics, and the effects of drugs on enzyme behaviour, research that has implications for a basic understanding of enzymes, and for pharmaceutical applications such as understanding drug metabolism. A better understanding of the interaction of drugs with these enzymes may lead to new treatments for Parkinson's disease and to new therapeutic anti-smoking strategies.	 Andrew Holt	University of Alberta	\$300,801	\$120,321
2009/10	Platelet-Angiogenesis Research Infrastructure for Development of Novel Angiogenesis Regulating Pharmaceuticals	The equipment purchased with this award will support research into cardiovascular disease and cancer in Alberta. Dr. Jurasz aims to better understand the role of blood platelets in regulating the formation of new blood vessels, and investigate their potential to be used as part of a new treatment for damaged tissue from heart disease or cancer.	 Paul Jurasz	University of Alberta	\$493,171	\$197,275


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2009/10	In Vivo Cellular Imaging of Brain Structure and Function in Models of Neurological and Neuropsychiatric Disease	The award will support the purchase of imaging equipment, including an in vivo multiphoton imaging system that allows researchers to see live, real-time, and high resolution views of cells, specifically neurons and glia. The research supported by this award may lead to improved stroke therapy.	 Ian Winship	University of Alberta	\$999,810	\$399,924
2009/10	An Analysis Suite for Characterizing of Smart Polymer/Nanoparticle Composites	The award will purchase specialized equipment, including a differential photocalorimeter and an infrared camera which will be used to study smart polymer/nanoparticle composites. These materials undergo changes when they are exposed to different stimulus like a magnetic field or light. The research will characterize the new materials to better predict and manipulate their unique behaviour, with the long term aim of developing them for biomedical applications.	 Anastasia Elias	University of Alberta	\$192,259	\$76,903
2009/10	Infrastructure for Synthesis of Materials for Alternative Energy Applications	The equipment supported by this award will be used to investigate lower cost manufacturing processes for commercial carbon nanotube composites. The award also supports a demonstration facility for friction stir welding, a new and highly efficient welding technique for joining high strength steels, which reduces metal fatigue, wear, and oxidation compared to traditional methods.	 Adrian Gerlich	University of Alberta	\$384,007	\$140,000
2009/10	Biodiversity Science and Conservation Ecology Group	The award will support the purchase of essential computing and field equipment for use in biodiversity conservation and wildlife management research. The research aims to develop tools for better regional conservation planning and improved sustainable forestry management practices, with the long term goal of protecting biodiversity in Alberta.	 Scott Nielsen  Fangliang He	University of Alberta	\$336,830	\$115,489
2009/10	Petroleum Microbiology Research Laboratory	Equipment purchased with this award will be used to understand the science of anaerobic (oxygenless) petroleum biodegradation. A better understanding of anaerobic hydrocarbon metabolism could lead to improved tailings pond reclamation, increased methane production from marginal reservoirs, and more effective natural environmental reclamation.	 Lisa Gieg	University of Calgary	\$482,559	\$193,024
2009/10	Infrastructure for Investigation of Organic Nitrates and Reactive Halogens in Laboratory Experiments and in Ambient Air	Dr. Osthoff's atmospheric science research will improve our understanding of pathways that lead to formation of secondary pollutants such as ozone and airborne particulate matter that affect people's health and climate. The atmospheric chemistry research equipment will allow more accurate impact assessments of emissions, and provide scientific instrumentation that presently does not exist in Canada.	 Hans Osthoff	University of Calgary	\$948,998	\$339,691

Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2009/10	Cell and Molecular Biology Suites for Studying Reproductive Development in Canola and Arabidopsis	The research equipment purchased with this award will allow Dr. Samuel to uncover novel genetic switches that control canola plant reproduction. Identification and manipulation of these novel genes will directly impact canola crop-yield. The infrastructure funds will build cell and molecular biology suites in the Department of Biological Sciences at the University of Calgary.	 Marcus Samuel	University of Calgary	\$973,538	\$280,000
2009/10	Establishment of a Molecular Parasitology Laboratory	Drug resistance in parasites is an important economic and animal welfare problem for live-stock agriculture and a major global human health problem. The proposed infrastructure will be used to investigate molecular mechanisms of drug resistance and apply the knowledge to improved diagnostics and control.	 John Gilleard	University of Calgary	\$544,505	\$212,427
2009/10	Germ Line Stem Cell Research Facility	Advances in germ line stem cell research affect biomedical research through generation of animal models and tissue regeneration, agricultural research through improved reproductive efficiency and dissemination of superior livestock genetics, and animal conservation through preservation of genetic material from rare and endangered animals.	 Ina Dobrinski	University of Calgary	\$605,131	\$240,938
2009/10	Environmental Impact of Prion Diseases	Prion diseases have had an enormous economic and social impact. Of particular importance to Alberta are bovine spongiform encephalopathy (cattle) and chronic wasting disease (deer, moose, elk). This application emphasizes the environmental impact of prion diseases, focusing on the binding of prions to soil, an interaction that enhances infectivity.	 Judd Aiken	University of Alberta	\$932,206	\$340,000
2009/10	Research Facility for the Characterization of Nano-based Biomaterials for Gene Delivery Applications	My research program is focused towards the design of cationic glycopolymers and glyconanoparticles for gene delivery applications. The acquisition of the following infrastructure, widefield microscope, zeta potential analyzer and differential scanning calorimeter/thermogravimetric analyzer, will strongly enhance our research capabilities and hence we expect to make significant progress in this highly innovative field of carbohydrate-based nanocarriers.	 Ravin Narain	University of Alberta	\$304,066	\$100,000
2009/10	Establishment of Novel Integrated Xenopus Oocyte Heterologous Expression Technologies for the Study of Nucleoside and Other Membrane Transporter Proteins.	Discovered in the YOUNG laboratory, this molecular study of how CNT and ENT proteins move nucleosides across plasma and intracellular membranes will combine the unique versatility/power of heterologous expression in Xenopus oocytes with other technological innovations to improve and expand therapeutic applications of nucleosides in cancer and other diseases.	 James D. Young	University of Alberta	\$939,858	\$340,000





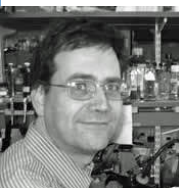
Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2009/10	Development of a Prion Agent Preparation Laboratory	This infrastructure will support my prion research laboratory focusing on the pathogenesis of prion agents and the characterization of chronic wasting disease. The research goal is to understand the molecular mechanisms of a prion infection.	 Debbie McKenzie	University of Alberta	\$208,113	\$80,000
2009/10	Enhancing mining efficiency and decreasing environmental impact using Scanning Probe Microscopy and X-ray Fluorescence Micro-Probe	Efficient and environmentally responsible mineral (coal and oil sands) processing is central to the continuing success of the natural resource based industry. But there are significant challenges. The industry requires step-out technology to exploit more complex forms of minerals and coal and deal with unpredictable variability of oil sands ores. The cyclical nature of the industry has resulted in a general reduction in training programs. We need to develop a critical mass in world-class mineral research and training.	 Zhenghe Xu	University of Alberta	\$797,971	\$313,798
2009/10	In vivo microscopy and real-time quantitative PCR infrastructure to investigate neurodegenerative disorders.	Diseases affecting the central nervous system are a major cause of death and disability in Alberta and Canada. The establishment of the Neurodegeneration Research Unit at the University of Calgary will provide infrastructure to investigate causes and treatments for these pathologies.	 Roger J Thompson  Shalina Ousman	University of Calgary	\$907,839	\$363,136
2009/10	Infrastructure for the Environmental Surface Research Laboratory	This fund will be used to equip an environmental surface research laboratory with state of the art equipment for use in research related to nanoparticles, microbes, and organic pollutants, and their interactions with engineered and natural surfaces.	 Yang Liu	University of Alberta	\$269,450	\$105,000
2009/10	Laboratory for the Fabrication & Testing of FRET and Plasmon-enhanced Nanostructured Photovoltaic Devices	Improvements in the design and processing of organic semiconductors coupled with advances in nanotechnology render possible medium to high efficiency solar cells at a fraction of the cost of conventional silicon-based photovoltaics. The fabrication & testing of such devices is the subject of the proposed research.	 Karthik Shankar	University of Alberta	\$204,902	\$80,000
2009/10	Targeting Signaling Pathways in Heart Failure: Potential for New Therapies	The current one year mortality rate after diagnosis of HF remains disturbingly high at between 25- 40%, not to mention the human toll of patient suffering prior to deaths. Our project will create a state-of-the art and highly specialized system in order to study the key elements of heart failure in experimental models which will be complemented by parallel experiments in human explanted hearts with the ultimate aim to foster our understanding of human heart failure and to create new therapies.	 Gavin Y. Oudit	University of Alberta	\$905,032	\$211,430





Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2009/10	Laboratory for Polymer Electrolyte Fuel Cell Research	Polymer electrolyte fuel cells (PEFCs) can improve energy efficiency and reduce negative emissions. In order for PEFCs to be commercially viable, their cost has to be reduced and their performance enhanced. Novel micro-fabrication techniques and computational design will be used to develop bio-inspired flow fields and electrodes for PEFCs that achieve the necessary cost reductions and performance improvement for commercialization.	 Marc Secanell Gallart	University of Alberta	\$211,869	\$81,854
2009/10	Molecular mechanisms of PCSK9 and ABCG1 in the maintenance of cholesterol homeostasis	Atherosclerotic heart disease is the number one killer in Canada. The requested infrastructure is critical to the success of my team's research on novel molecular mechanisms in cholesterol homeostasis and atherosclerosis. Our findings will lead to the creation of new therapies to reduce the disease.	 Dawei Zhang	University of Alberta	\$672,890	\$269,158
2009/10	Infrastructure for studying both the biophysics of infectious prion oligomers and the prion disease pathology they induce.	The infrastructure will be used to: 1) isolate and characterize the biophysical properties of infectious prion protein oligomers ; 2) produce 3D reconstructions of neurons in mouse brain slice cultures after exposure to prions; and 3) investigate the early stages of prion disease pathogenesis in vitro.	 Valerie Sim	University of Alberta	\$1,000,000	\$400,000
2009/10	A high pressure chemisorption analyzer for characterization of heterogeneous catalysts under industrial conditions	Funds are requested to purchase equipment for the characterization of heterogeneous catalysts under industrial conditions . The equipment consists of a chemisorption analyzer, which is capable of performing temperature programmed reactions, and a mass spectrometer to analyze products.	 Vinay Prasad  Natalia Semagina	University of Alberta	\$323,064	\$129,175
2009/10	Analysis of the role of genetically defined interneurons in the operation of the locomotor and respiratory CPGs.	The studies proposed in this application will investigate the structure and function of neural networks that underlie simple rhythmic behaviours such as breathing (respiration) and walking (locomotion). The results of these studies will enable us to identify the developmental processes that are essential for the assembly of these neural networks, and allow us to better understand how the respiratory and locomotor behaviours are initiated.	 Simon Gosgnach	University of Alberta	\$929,302	\$371,721
2008/09	Airborne electromagnetic sea ice thickness sensor	Airborne electromagnetic sea ice thickness sensor - Acquiring this equipment will improve the ability to accurately measure and monitor ice thickness changes, providing valuable insight into how sea ice levels may indicate changes in the climate.	 Christian Haas	University of Alberta	\$401,250	\$100,000

Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2008/09	Laboratory for passive seismic imaging of earth processes	Laboratory for passive seismic imaging of earth processes - This award is to develop a laboratory for passive seismic imaging of the earth's processes which will use naturally occurring mini earthquakes as a source of seismic waves instead of artificial methods such as dynamite or air guns. Equipping this laboratory offers the opportunity to advance a wide range of areas including earthquake hazard analysis, CO2 capture and storage, oil recovery efficiency and the earth's physical evolution.	 David Eaton	University of Calgary	\$808,090	\$303,236
2008/09	A transgenic zebrafish facility to study prion proteins, neurodegenerative disease and photoreceptor regeneration	A transgenic zebrafish facility to study prion proteins, neurodegenerative disease and photoreceptor regeneration - the award will advance the study of prion function and retinal degenerative disease as Zebrafish share similar genetic material with mammals and are useful models for studying human diseases. Such research will potentially assist in the detection and treatment of BSE, CWD, Creutzfeldt-Jakob disease and retinal degenerative diseases such as macular degeneration.	 William Allison	University of Alberta	\$206,265	\$81,050
2008/09	Post-translational modifications and the proteome during Apoptosis	Post-translational modifications and the proteome during Apoptosis The funding for purchase of a high definition mass spectrometer system will further the understanding of Multiple Myeloma, a form of cancer of the plasma cells. The research aims to generate insight into cancers that appear to be resistant to conventional treatments. This research may lead to the discovery of more effective treatments for these cancers.	 Richard Fahlman	University of Alberta	\$984,205	\$393,682
2008/09	Development of a comprehensive platform for the value-added utilization of poultry products	Development of a comprehensive platform for the value-added utilization of poultry products - The funding to complement the value-added poultry program at the University of Alberta. Some of Dr. Wu's research projects include an egg biorefinery which intends to develop ways to make use of all parts of the egg from the shell to the yolk. A value-added meat program is also incorporated into this award, and will attempt to determine ways to increase the nutritional value of poultry and overall efficiency of the poultry industry. These initiatives will assist in strengthening Alberta's agriculture industry and may develop products which will increase the health of Albertans.	 Jianping Wu  Mirko Betti  Robert Renema	University of Alberta	\$341,182	\$120,000
2008/09	Quantitative photoacoustic imaging technology development	Quantitative photoacoustic imaging technology development - The award will assist in developing a new molecular imaging technology to generate images, such as the amount of oxygen that a body tissue uses, to monitor the development of diseases such as cancer and heart disease, as diseased tissue uses less oxygen than healthy tissue.	 Roger Zemp	University of Alberta	\$373,981	\$135,000
2008/09	Obesity Research Laboratory	Obesity Research Laboratory - Equipment purchased will further the study of the role of gastrointestinal signals in regulating food intake, which aims to better understand the complex nature of obesity and the physiological mechanisms that play a key role in obesity in both humans and animals. Dr. Chelikani's laboratory will be a powerful tool in designing future programs for the treatment and prevention of obesity.	 Prasanth Chelikani	University of Calgary	\$1,140,695	\$456,278

Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2008/09	Functional Genomics Laboratory for deciphering gene-regulatory and genetic-interaction networks	Functional Genomics Laboratory for deciphering gene-regulatory and genetic-interaction networks - This award will help equip a laboratory for functional genomics which includes an SGA (synthetic genetic array) suite and a microarray suite. With these tools, Dr. Chua aims to uncover and better understand the genetic origin of many human diseases.	 Gordon Chua	University of Calgary	\$1,186,860	\$474,745
2008/09	A microbiological culture and biochemistry laboratory for carbohydrate research	A microbiological culture and biochemistry laboratory for carbohydrate research - The award supports exploring a novel approach to the treatment of cancer and other infectious diseases that combines the areas of organic chemistry and microbiology. This research has the potential to impact the area of vaccination and the treatment of cancer and infectious diseases through the study of the interaction between carbohydrates and proteins, which plays a role in conditions such as cancer, viruses, autoimmune diseases and inflammation.	 Chang-Chun Ling	University of Calgary	\$877,460	\$350,983
2008/09	Laboratory for computational structural biology: Theoretical gateway to molecular origins of selective ligand binding to membrane proteins	Laboratory for computational structural biology: Theoretical gateway to molecular origins of selective ligand binding to membrane proteins - This award will help develop a greater understanding of how proteins on the cell surface or on a membrane within a cell bind to other molecules, which may become a powerful tool for advancing the effectiveness of therapeutic drugs and may provide insight into new methods of drug delivery.	 Sergei Noskov	University of Calgary	\$756,419	\$194,352
2008/09	Mass spectrometry for elucidation of glycan structure and post translation modification of proteins in glycobiology	This award will be used to purchase a specialized mass spectrometer to boost capability to investigate the chemical biology of carbohydrates. This new equipment will also be made available to other researchers interested in glycobiology. The aim is to broaden the basic understanding of glycobiology, as well as to develop carbohydrate-based vaccines and therapeutics.	 David Bundle	University of Alberta	\$973,162	\$369,776
2008/09	Bioenergy and the uncultured microbial majority	This award will help establish a new environmental microbiology laboratory at the University of Calgary to further the understanding of how microbial species and novel biotechnological applications of bacteria might advance the use of microbial activity for important environmental and industrial needs.	 Peter Dunfield	University of Calgary	\$834,328	\$329,393
2008/09	Harnessing leading edge technology for osteoarthritis therapeutics; unprecedented resolution of cartilage cell signaling and macromolecular interaction with synovial fluid	Many Canadians suffer from osteoarthritis, a disease characterized by the wearing away of cartilage and a decrease in the amount of protective synovial fluid in the joint. This award will support the purchase of a highly sensitive confocal microscope that allows researchers to observe live cells and molecules for longer periods of time compared to earlier confocal technology. The equipment will be used to investigate potential new treatments for osteoarthritis and the research will contribute to providing a long term solution for people living with osteoarthritis.	 Wayne Giles  Andrea Clark  Tannin Schmidt	University of Calgary	\$1,283,400	\$513,360




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2008/09	Microfocus X-ray Diffractometer	The grant will modernize equipment to improve the quality of x-ray data collected at the University of Calgary. The research is focused on the development of potential antiviral medications and treatment options for norovirus gastroenteritis and similar diseases.	 Kenneth Ng	University of Calgary	\$722,019	\$288,808
2008/09	Nano/micro-encapsulation of nutraceuticals and bioactives for functional foods	Researchers will combine their expertise in nano-technology and food science in order to develop new food ingredients with superior properties. The award will support the purchase of equipment to help in the study of using Alberta crops, such as barley and flax, to produce high-value ingredients which deliver nutraceuticals into foods, creating functional food products. The research has the potential to boost the value of Alberta crops, and improve the nutritional value of processed foods.	 Marleny Aranda Saldana  Jonathan M. Curtis  Lingyun Chen	University of Alberta	\$432,484	\$168,700
2008/09	In vivo evaluation of immune tolerance	The award will help improve the study of autoimmune disorders through further understanding of the role of the thymus in this regulatory process. It is anticipated that this new knowledge will have an impact on the fields of organ transplantation and chronic infections such as Hepatitis B and C, and HIV.	 Troy Baldwin	University of Alberta	\$150,700	\$60,280
2008/09	Molecular Signatures Platform to Characterize Aggressive and Indolent Prostate Cancer	The project aims at identifying biomarkers for aggressive prostate cancer that could be implemented clinically prior to treatment. Researchers will investigate the most promising genes and their secreted proteins as tissue and serum biomarkers using automated high-throughput tissue and proteomics scanning systems.	 Tarek Bismar	University of Calgary	\$160,001	\$64,000
2008/09	From the microcirculation to whole-body function: laboratories to investigate the effects of aging and physical activity on vascular control and functional capacity	This award will assist in establishing a laboratory designed to further understand the relationships between aging and physical activity on blood vessel regulation and will explore physical activity as a treatment option to slow down or reverse the degradation of arterial blood vessels.	 Darren DeLorey	University of Alberta	\$435,052	\$174,000
2008/09	Laboratory for the development and in situ characterization of complex solid/liquid interfaces: from biomimetic materials to greener catalysts	The award will be used towards equipment to investigate the bonding of small molecules or ions in solution to surfaces and has the potential to impact many areas, including antibiotic resistance and the development of new catalysts for the energy and ICT sectors.	 Julianne Gibbs-Davis	University of Alberta	\$652,600	\$240,000

Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2008/09	Infrastructure for the air quality characterization and control research laboratory	Dr. Hashisho aims to develop new technologies and materials to better control air quality. One particular area of concern is the emission of volatile organic compounds (VOC's) which pose serious health and environmental implications. VOC's are emitted from sources such as paints, furniture, flooring materials, perfumes, and petrochemical-based materials. The infrastructure purchased will assist Dr. Hashisho in creating new, cost-effective ways of controlling these emissions.	 Zaher Hashisho	University of Alberta	\$361,801	\$125,000
2008/09	Structural and functional study of membrane proteins in disease	This award will help develop a modern membrane protein expression, purification, and crystallization facility with equipment capable of investigating how the functions of membrane proteins contribute to diseases such as Type 2 Diabetes, blindness, and Alzheimer's. The findings from preliminary research may lead to further developments in novel treatment options for these diseases.	 Joanne Lemieux	University of Alberta	\$569,641	\$227,856
2008/09	Establishment of a facility to study carcinogen metabolism and transmembrane transport	The award will help further investigate cellular metabolism, focusing on the transport of carcinogens across cell membranes. The research will study arsenic and tobacco smoke, two major contributors to cancer, and aims to develop new treatment options for the disease.	 Elaine Leslie	University of Alberta	\$614,072	\$210,000
2008/09	Bacterial biofilm cultivation and imaging with confocal microscopy	This award will help develop a greater understanding of how proteins on the cell surface or on a membrane within a cell bind to other molecules, which may become a powerful tool for advancing the effectiveness of therapeutic drugs and may provide insight into new methods of drug delivery.	 Shawn Lewenza	University of Calgary	\$483,306	\$193,322
2008/09	Molecular analysis of the host-pathogen interface	The award will establish a state-of-the-art molecular pathogenesis laboratory, which will support research aimed at developing alternative treatment strategies to fight bacterial infections. The researcher's approach is to identify compounds that interfere with the molecular interactions at the interface between bacterial pathogens and their hosts.	 Stefan Pukatzki	University of Alberta	\$444,680	\$177,872
2008/09	Tools for Modeling DNA Damage and Repair	The award will purchase computer resources for the research program at the University of Lethbridge. By using computer modelling, Dr. Wetmore investigates how our DNA is damaged by carcinogens and how our bodies use enzymes to repair this damage. The DNA modelling aspect of Dr. Wetmore's research has the potential to be used for the design of new molecules to combat diseases such as cancer.	 Stacey Wetmore	University of Lethbridge	\$353,107	\$122,087

Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2008/09	Memory networks: ensemble recording, functional imaging, and neurocomputational studies on the biology of memory	Dr. McNaughton's highly innovative research aims to understand the biological mechanisms underlying higher brain function, bringing brain science to a more complete understanding of normal brain function. The results of Dr. McNaughton's research may help us to develop better treatments for brain-related disorders such as Parkinson's disease, fetal alcohol syndrome, brain trauma, stroke, and substance abuse.	 Bruce McNaughton	University of Lethbridge	\$1,277,759	\$426,748
2008/09	Bioengineering Technologies for the Clinical Application of Stem Cells	The award will be used to develop a reliable, efficient and safe method to scale-up the production of specialized stem cells, which could become important in the treatment of Parkinson's and Huntington's diseases. With this equipment, Dr. Behie's team will also have the ability to characterize other types of stem cells, potentially leading to new treatments for diseases such as diabetes, arthritis, and heart disease.	 Leo Behie	University of Calgary	\$704,081	\$200,000
2008/09	High Power Micro-Computed Tomography (CT) at the University of Calgary	The award will purchase imaging equipment that enhances the capacity at the University of Calgary to do high powered scanning of bone and fossil material. It will become the highest-powered CT scanner at the institution and will be used by the researchers for their program in comparative bone and joint biology.	 Jason Anderson  Jessica Theodor	University of Calgary	\$601,524	\$240,609
2008/09	Multi-Touch Displays for Interactive Information Visualization	The award will purchase equipment that will enhance research capacity in software development for multi-touch digital displays. The software for this new type of display, called massively multi-touch (MMT), encourages collaborative, visual and interactive access to data.	 Sheelagh Cpendale	University of Calgary	\$468,690	\$182,537
2008/09	Structural Mass Spectrometry for Developing Therapeutics	The award will support the purchase of a specialized mass spectrometer to develop new imaging technology, advancing our understanding of highly complex protein interactions. With this new capacity, Dr. Schriemer and his team will be able to make important research contributions to the development of antibacterial vaccines and therapies for breast cancer.	 David Schriemer	University of Calgary	\$1,580,174	\$579,912
2008/09	Exploring the Molecular Basis of Transcriptional Control Inside Living Embryos	The award will support the purchase of potentially transformative light microscopy equipment that will allow the researchers to observe single genes being transcribed within a cell or individual proteins interacting with each other. Dr. McGhee will use this demonstration technology to observe and study the transcription of genes in the nematode animal model, which will aid in our understanding of the human digestive tract.	 James McGhee  Jeffrey Gaudet	University of Calgary	\$1,964,914	\$785,966

Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2008/09	A laser scanning facility for rapid three-dimensional measurement	The award will purchase laser scanning equipment of importance to both geomatics engineering and bioengineering. The research program will specifically focus on potential applications to the analysis of the structural integrity of infrastructure such as bridges, the detection and diagnosis of scoliosis, and the application of surveying and mapping services to private industry and government.	 Derek Lichti	University of Calgary	\$354,117	\$139,523
2008/09	Infrastructure to support the environmental risk assessment of novel transgenic crops	The award will purchase equipment for this research program that will assess the environmental risk of new crops. One of these crops is a specialized canola which uses nitrogen much more efficiently than the canola that is currently available on the market. The researchers will thereby contribute to the important testing process, which will ensure the biosafety of these new crops.	 Linda Hall  Habibur Rahman  Randall Weselake	University of Alberta	\$650,100	\$259,860
2008/09	Microfluidics Platform for Transport Processes in Porous Media related to Energy Sector	This award will purchase equipment to enhance research on the interactions between water, oil, and rock at a micro-scale (microfluidics) that occur in porous material, such as the oilsands reservoirs. Dr. Mitra's research has the potential to create new opportunities for Alberta companies involved in the energy sector by reducing the amount of energy and water needed for oil exploration activities.	 Sushanta Mitra	University of Alberta	\$289,816	\$89,575
2008/09	Infrastructure for Deployment and Maintenance Environmental Wireless Sensor Networks	This award will purchase equipment to further develop and test the deployment of wireless sensor networks on the landscape. The equipment is essential to the team's aim to increase the sensitivity of the technology for detecting remote signals. The fully developed technology could be used for avalanche detection, environmental monitoring, forest fire management, and other related applications.	 Sebastian Maciejowski  Geoffrery Messier  Bob Davies	University of Calgary	\$343,955	\$127,027
2008/09	Functional Inorganic Polymers: New Hydrogen Storage Materials and Precursors to Chemically Resistant and Insulating Nanomaterials	This award will purchase equipment to launch this research program in polymer chemistry and nanoscience. One of the research goals is to develop new methods to safely store hydrogen for use in fuel cells. The new equipment is essential for his team to build novel hydrogen storage devices and will complement the facilities already available in the University of Alberta's Alberta Centre for Surface Engineering and Science.	 Eric Rivard	University of Alberta	\$298,040	\$96,400

Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2008/09	Advanced Microwave to Millimeter-wave MEMS and CMOS System Development	Drs. Daneshmand and Moez will combine their expertise in radio frequency devices and integrated circuits and systems to develop new microwave devices and test their functionality and limitations. The new devices can be used to improve the speed of data communications and lower the cost of communication products.	 Mojgan Daneshmand  Kambiz Moez	University of Alberta	\$543,950	\$217,580
2008/09	A laboratory to study novel aspects of Neurofibromatosis Type 2 regulation	The award will purchase equipment to study genes that have the potential to regulate Neurofibromatosis Type 2 (nervous system tumours). The disorder affects hundreds of patients in Alberta and the current treatment approach, surgery, does not cure the patient of the disease. Dr. Hughes is investigating a new approach to understand why the disease occurs and how to use this understanding to regulate the growth of the tumour.	 Sarah Hughes	University of Alberta	\$347,248	\$138,899
2008/09	Instrumentation for Nano-particle Research	Dr. Olfert will use the award to purchase equipment to understand how particulate matter emissions affect climate, the environment, air quality, and human health. One of the aims of Dr. Olfert's research is to help inform policy decisions regarding particulate matter emissions. Another aspect of his research is to identify particulate matter from its source and try to reduce its release into the atmosphere.	 Jason Olfert	University of Alberta	\$287,781	\$101,335
2012/13	Renewable Energy Centre for Sustainable Innovation	The Lakeland Centre for Sustainable Innovation (LCSI) will be located at the Barr Research Site, adjacent to the Vermilion campus. The infrastructure will allow further development of novel thermal storage options for evaluation, the testing of control systems and the collection and transmission of data from the multiple sources to one interface.	 Rob Baron	Lakeland College	\$1,427,508	\$571,001
2012/13	Environmental Technologies Infrastructure associated with Clean Energy Production	RCP provided funding for modular applied research infrastructure to reduce industrial impacts on water, soil and air quality. The platforms will comprise a Produced Water Treatment Train, Air Quality Monitoring Trailer, and Soil Trailer labs for the design, development, testing, and validation of innovative technologies that enhance environmental performance.	 Vita Martez	SAIT Polytechnic	\$1,999,535	\$799,525

Funding Year	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	RCP Funds Approved
2011/12	NAIT Boreal Research Institute: Plant and Seed Technologies for Boreal Reclamation	novaNAIT Boreal Research Institute (nBRI) is located in Peace River, Alberta, 500 km northwest of Edmonton, in the heart of the boreal forest region. As a satellite campus of NAIT, nBRI has a 15-year track record in delivering applied research solutions and transferring knowledge to industry, small and medium-sized enterprises (SMEs), municipalities, and First Nations and Metis organizations. nBRI is requesting investment for the fitting out and equipping of a 1,000 ft ² modular research laboratory at Peace River. The laboratory will facilitate testing of seed viability, dormancy, and germination and will include growth chambers, bench equipment, and cold storage.	 Hugh Seaton	NAIT	\$2,000,000	\$800,000
2011/12	Oil Sands Environmental Sustainability: Centre for Green Chemistry and Engineering at NAIT	The aim of this project will be to bring NAIT's applied research capacities in chemistry and engineering, to work with SMEs and oil sands operators, for validating existing fluid tailings treatment technologies, and assist in further developing new technologies. The team will approach the problem from an end-to-end systems perspective, i.e. the de-watering and stabilization of fluid tailings, and utilization of the released process-affected water. Accurate measurement and monitoring systems will also be required for compliance.	 Haneef Mian	NAIT	\$2,526,637	\$799,864
2011/12	Green Building Technologies Project	The GBT Lab and Demonstration Centre, a 650m ² facility comprised of 20 reclaimed intermodal shipping containers. The NSERC- supported team and new researchers attracted to the facility will conduct industry-driven product and technology prototyping, redesign, testing and development. The new facility will augment the two-storey, 131m ² GBT shipping container office to be built in 2011 . The Lab structure itself will be used to construct Net Zero homes and conduct research to meet NZEH and Architectural Ecology targets, with project activities occurring inside, within, and on the outside of the facility.	 David Silburn	SAIT Poly-technic	\$1,999,050	\$799,525
		168 Projects Total		TOTAL:	\$116,721,371	\$44,550,236

Total Number of Projects - 193	Total Project Cost	Funds Approved
LARGE EQUIP. TOTAL:	\$185,848,013	\$63,258,366
SMALL EQUIP. TOTAL:	\$116,721,371	\$44,550,236
GRAND TOTAL:	\$302,569,384	\$107,808,602



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