



UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING



CELEBRATING
RESEARCH
SUCCESS

WELCOME

Message from the Dean Cristina Amon

In this past year, the Engineering research community received more than 138 top research awards and grants, in recognition of outstanding research, innovative projects, and professional contributions.

Our Faculty has a distinctive mission and history that set us apart from other schools. In our 135-year history, the world has evolved rapidly and continues to dynamically change, providing extensive opportunities for us as Engineers and Engineering researchers. As global Engineering leaders in our respective fields, we have embraced this change and responsibility, creating a forward-looking Faculty that was recently ranked No. 1 in Canada and among the top 11 engineering schools in the world by the London Times' Higher Education Supplement. We are grateful for all your outstanding contributions and commitment to research and education excellence, which will help us to continue building upon the momentum of this great Faculty.

This has been a remarkable year for our Faculty, and I am delighted that you are able to share in the success of our research awards at this event today.

Cristina Amon
Dean

Message from the Vice-Dean, Research Stewart Aitchison

This has been a record year for the Faculty. We were awarded \$59.6M in research funding (our highest level of funding ever), and based on our ongoing success we have every reason to believe this number will continue to grow. Our tri-council funding continues to increase, reaching \$18.7M this year, and our industrial funding increased to \$6.5M. We have continued to build strong industrial partnerships and we are working to increase the visibility of our research achievements with events like the Energy Research Showcase on June 19. This will be the first in the series of events highlighting our research initiatives in key areas.

None of this would be possible without the outstanding achievements of our faculty members and the staff members who support them. Thank you for making this academic year such a success, and for joining us to celebrate our success today.

Stewart Aitchison
Vice-Dean, Research

2008 NSERC DISCOVERY GRANT RECIPIENTS

Department of Chemical Engineering and Applied Chemistry

Name	Project Title
Tim Bender	Subphthalocyanines to achieve broad spectral absorption and produce a photocurrent in an organic solar cell
Charles Jia	Fundamental aspects of sustainable energy and metal productions
Mark Kortschot	Generating optimal 3D structures in natural fibre reinforced polymers
Yuri Lawryshyn	Development of a fundamental model to predict UV reactor performance for photolysis and advanced oxidation processes
Emma Master	Engineering biocatalysts for the development of Novel materials from lignocellulosic biomass
Charles Mims	The study of surface reactions under dynamic conditions
Michael Sefton	Tissue engineering
Chris Yip	Probing biomolecular assembly: structure and dynamics

Department of Civil Engineering

Name	Project Title
Constantin Christopoulos	Self-centering seismic-resistant steel structures
Paul Gauvreau	Design of efficient concrete bridge deck slabs
Bryan Karney	Evaluating infrastructure investments in water supply and distribution networks through a comprehensive assessment of hydraulic and water quality objectives and tradeoffs

Name	Project Title
Christopher Kennedy	Design of infrastructure for sustainable neighbourhoods
Daman Panesar	The influence of ion-binder interactions on the durability of cement-based material
Shamim Sheikh	Behaviour of new and existing concrete structures

The Edward S. Rogers Sr. Department
of Electrical and Computer Engineering

Name	Project Title
Brendan Frey	Affinity propagation: theory and practice
Hans-Arno Jacobsen	The foundation for event management systems
Jim Lavers	Coupled electromechanical and electrothermal problems in continuous casting
Al Leon-Garcia	Design of converged communications and computing infrastructure
Manfredi Maggiore	Set stabilization: theory and applications
Lacra Pavel	Control algorithms for robust and adaptive photonic networks
Joyce Poon	Active optical microresonators
Costas Sarris	Multiscale computational electromagnetics
Kevin Truong	Development of computational tools for studying protein sequences, structures and signaling networks
Sorin Voinigescu	100+ GHz silicon electronics
Safwat Zaky	Asynchronous circuits and systems
Stefan Zuktynski	Modelling of complex hydrothermal ore-forming fluids in multi-episodic tectonic terrances

Institute of Biomaterials and Biomedical Engineering

Name	Project Title
Julie Audet	Single-cell sampling and analysis
Michael Joy	Development of current density and impedance imaging with MRI
Ofer Levi	Optical nanostructures for high sensitivity bio-sensing

Department of Materials Science and Engineering

Name	Project Title
Mansoor Barati	Development of dynamic slag foaming model
Thomas North	Friction stir spot welding fundamentals
Doug Perovic	Structure/property relationships in advanced materials for electronics and photonics
Harry Ruda	Novel excitonic-engineered nanowire structures

Department of Mechanical and Industrial Engineering

Name	Project Title
Michael Bussman	Modelling interfacial flows with contact lines
Michael Carter	Quantitative applications for health care planning, scheduling and resource allocation
Mark Chignell	Emotional interaction with robots and computers
William Cleghorn	Analysis and design of mechanical systems having flexibility
David James	Flow of complex fluids

Name	Project Title
Greg Jamieson	Human factors in sustainable energy consumption
Olivera Kesler	Non-destructive diagnosis of solid oxide fuel cell performance and degradation
Andreas Mandelis	Development of advanced photoacoustic, photothermal and photocarrier techniques and biosensors for biomedical and optoelectronic diagnostics
Shaker Meguid	Multiscale modelling and characterization of nanoreinforced composite laminates
James Mills	Micro-scale robotic task control and automation
Goldie Nejat	Intelligent assistive technologies for varying real-world environments
A.W. Neumann	Applied surface thermodynamics
Jan Spelt	Applications of controlled erosion: vibratory finishing and abrasive jet micro-machining
Charles Ward	Energy transport by surface tension-driven convection
Lidan You	Bone cell mechanotransduction study on a chip
Jean Zu	Dynamic analysis and design optimization of advanced automotive belt/drive/systems for micro hybrid vehicles

University of Toronto
Institute for Aerospace Studies

Name	Project Title
Tim Barfoot	Localization for planetary rovers
Alis Ekmekci	Control of vortex shedding from a cylinder via geometrical surface disturbances
Peter Grant	Upset recovery simulation
Joaquim Martins	High-fidelity aircraft design optimization for minimal environmental impact

RESEARCH TOOLS AND INSTRUMENTS RECIPIENTS

Department of Chemical Engineering and Applied Chemistry

Name	Project Title
Edgar Acosta Grant Allen Elizabeth Edwards Emma Master Ramin Farnood Radhakrishnan Mahadevan	Catalytic TOC analyzer for solids, liquid and gases
Tim Bender	Glove box and solvent purification system for air and moisture sensitive synthesis (target: metal free subphthalocyanine)
Levente Diosady Yu-Ling Cheng Edgar Acosta	Laboratory spray drier
Yuri Lawryshyn	Computer workstation for CFD modelling
Molly Shoichet Cindi Morshead Milica Radisic	Real time RT-PCR for advanced tissue engineering

Department of Civil Engineering

Name	Project Title
Ronald Hofmann Robert Andrews	Total organic carbon analyzer
Daman Panesar Douglas Hooton	Dynamic vapour sorption (DVS) balance to evaluate the microstructure of porous building materials

The Edward S. Rogers Sr. Department of Electrical and Computer Engineering

Name	Project Title
Reza Iravani	High speed data logger for electronically-coupled distributed resource units
Hoi-Kwong Lo Li Qian	Quantum cryptography: from theory to practice

Department of Mechanical and Industrial Engineering

Name	Project Title
Axel Guenther Gregory Scholes Lidan You	Microscale velocimetry and fluorescence lifetime imaging system
Craig Simmons Yu Sun Aaron Wheeler	Non-contact plotter for precise patterning of proteins on novel microdevices
Yu Sun Craig Simmons Lidan You	A polscope for non-invasive visualization of meiotic spindle
Murray Thomson	FTIR spectrometer for biofuel research
Jean Zu	Multi-channel dynamic signal analyzer for research on advanced automotive belt drive systems of micro hybrid vehicles

University of Toronto Institute for Aerospace Studies

Name	Project Title
Ted Barfoot Gabriel D'Eleuterio Hugh Liu	Motion tracking system for autonomous vehicles laboratory

Name	Project Title
Omar Gulder Alis Ekmekci	Stereo particle image velocimetry system for combustion and turbulence studies

2007 / 2008 STRATEGIC GRANTS RECIPIENTS

Name	Project Title
Emma Master	Novel enzymes for conversion of biomass to energy: applied structural and functional proteomics of uncharacterized microbial hydrolases and oxidoreductases
	Extraction and enzymatic modification of Xylan for cellulose fibre engineering
Dimitrios Hatzinakos	Biometrics user-centric sensor networks (BUSNet)
Peter Herman	Burst femtosecond lasers: intelligent processing for 5D spectroscopy and photonics manufacturing
Stavros Argyropoulos	Development of efficient methods and procedures to intensify the melting and dissolution rates of solids in liquid Al
Mansoor Barati	Low cost production of solar grade silicon from metallurgical grade silicon
Alex McLean	Thermodynamic evaluation of waste residues pertaining to the reuse of industrial waste and contaminated sites
Harry Ruda	Microsystem for gas sensing
Hugh Liu	Autonomous navigation and control of multiple small satellites in formation flying

2007 / 2008 STRATEGIC SUPPLEMENTS RECIPIENTS

Department of Chemical Engineering and Applied Chemistry

Name	Project Title
Tim Bender	Organic crystals and polymers for a plastic solar cell
Donald Kirk	Development of sulphur dioxide activated carbon for supercapacitors
Emma Master	Reagent discovery for biomass conversion

The Edward S. Rogers Sr. Department of Electrical and Computer Engineering

Name	Project Title
Tarek Abdelrahman	Enabling multicore chips: bridging the programmability gap in today's parallel systems
Ashvin Goel	Securing internet client computers
Amr Helmy	Quantum information processing on a chip
Reza Iravani	Integration of energy storage in distribution secondary networks to enable high-depth of penetration of distribution generation
Ben Liang	On design of next-generation wireless metropolitan area networks with mobile multi-hop relays

2008 ONTARIO RESEARCH FUND RESEARCH EXCELLENCE RECIPIENTS

Name	Project Title
Robert Andrews	Control of emerging contaminants
Nasser Ashgriz	Green auto power train
Warren Chan	Quantum dot diagnostics project
Dimitrios Hatzinakos	Self-powered sensor networks
Reza Iravani	Greenhouse gas emission free and energy efficient power technology for information systems
Nazir Kherani	High efficiency silicon photovoltaics

2007 / 2008 CFI LEADERSHIP OPPORTUNITY FUND RECIPIENTS

Name	Department
Elizabeth Edwards	Department of Chemical Engineering and Applied Chemistry
Georgia Fotopoulos Matthew Roorda	Department of Civil Engineering
Sean Hum Joyce Poon	The Edward S. Rogers Sr. Department of Electrical and Computer Engineering
Ofer Levi Eli Sone	Institute of Biomaterials and Biomedical Engineering
Olivera Kesler	Department of Mechanical and Industrial Engineering
Mansoor Barati	Department of Materials Science and Engineering

2007 / 2008 EARLY RESEARCHER AWARDS RECIPIENTS

Round Three

Name	Department
Constantin Christopoulos	Department of Civil Engineering
Christiana Amza Amr Helmy Ben Liang Konstantinos Sarris Greg Steffan Kevin Truong	The Edward S. Rogers Sr. Department of Electrical and Computer Engineering
Warren Chan Milica Radisic	Institute of Biomaterials and Biomedical Engineering
Christopher Beck Hani Naguib	Department of Mechanical and Industrial Engineering

Round Four

Congratulations to the five recipients of Early Researcher Awards in Round Four. We will announce their names as soon as the Ministry has made the official announcement.

2007 / 2008 CANADA RESEARCH CHAIRS

Name	Chair Title
Timothy Barfoot	CRC in autonomous space robotics
Brendan Frey	CRC in information processing and machine learning
Olivera Kesler	CRC in fuel cell materials and manufacturing

2007 / 2008 CANADA RESEARCH CHAIRS RENEWALS

Name	Department
Frank Kschischang	CRC in communication algorithms
Wei Yu	CRC in information theory and digital communications
Joaquim Martins	CRC in multidisciplinary optimization
David Zingg	CRC in computational aerodynamics and environmentally friendly aircraft design
William Stanford	CRC in stem cell bioengineering and functional genomics

OTHER RESEARCH AWARDS

Name	Award
Elizabeth Edwards	Killam Research Fellowship
Goldie Nejat	NSERC University Faculty Award
Joyce Poon	NSERC University Faculty Award
Ted Sargent	Genome Canada Technology Development Kaust Global Technology Partnership
Michael Sefton	Killam Prize
Molly Shoichet	Killam Research Fellowship

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