



# Annual Review

2012-2013



**(C<sup>5</sup>MPT)**

Canadian Centre for Clean Coal/Carbon  
and Mineral Processing Technologies



*We support sustainable development of  
Canada's natural resources– reducing or  
eliminating environmental impacts such as  
water use and greenhouse gas emissions –  
by educating a new generation of clean energy  
engineers and driving economic growth and the  
creation of highly skilled, sustainable jobs.*

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**Bryan Rairdan, P.Eng**

**Manager, Project Metallurgy**

*Teck Resources Ltd.*

## **Message from the Management Advisory Board Chair**

The Canadian Centre for Clean Coal/Carbon and Mineral Processing Technologies (C<sup>5</sup>MPT) provides an exceptional opportunity for industry sponsors to become involved in a high-quality research centre in a cost- and resource-efficient manner. As mineral processing projects and operations worldwide increase in technical complexity, understanding the overlapping technical aspects of multiple industries and applying that knowledge across traditional boundaries is vital to optimizing the development of natural resources. The focus on coal, carbon and mineral processing technologies has allowed C<sup>5</sup>MPT's sponsors to gain knowledge to which they otherwise would not have been privy.

In addition, the ongoing development of Highly Qualified Personnel will continue to provide industry-wide solutions to the two-pronged challenge of increased industry technical demands and rapidly changing global demographics. The relationships that Teck has developed through its association with C<sup>5</sup>MPT have produced concrete improvements in the technical understanding of mineral processing phenomena for our projects and operations. These relationships have also resulted in the recruitment of multiple highly skilled individuals to Teck, thereby improving our internal technical and research capabilities.

On a personal level, I have enjoyed working with the members of the C<sup>5</sup>MPT management team and advisory board, and have gained a strong appreciation for the invaluable opportunity inherent in having access to the focused research undertaken by the world-class researchers associated with C<sup>5</sup>MPT.

At Teck, we look forward to a productive and mutually beneficial relationship for years to come.

*Sincerely,*

***Bryan Rairdan***



**Dr. Qingxia (Chad) Liu**

**Professor, Department of Chemical  
and Materials Engineering**

*University of Alberta, Canada*

## Message from the Scientific Director

The Canadian Centre for Clean Coal/Carbon and Mineral Processing Technologies (C<sup>5</sup>MPT) was established in June 2010 and is the first research and education centre of its kind in Canada that supports sustainable and responsible energy and mineral development. It is distinctive in its systems approach and the breadth of its research. The partnership of industry, government and academia, and a model of collaborative vision among leading researchers are what set C<sup>5</sup>MPT on the cutting edge of innovation and collaboration. Individually, each of our nine primary researchers is an acknowledged expert and world-renowned scholar. Their combined work within the Centre provides alignment of efforts and synergies.

### **Our goals are to:**

- Develop technologies for responsible resource processing and utilization.
- Provide the fundamentals of science and understanding needed for commercialization of breakthrough technologies that will allow the sustainable development of our natural resources.
- Create an exceptional education and learning environment ensuring the continuing supply of future scientists and engineers.
- Raise public awareness of the technical challenges and opportunities in environmental protection and sustainable development of natural resources in Alberta and Canada.

The potential economic, environmental and societal benefits of this research are priorities in Canada, yet global in span. Coal provides more than fifty percent of global electrical power generation and is a major industrial energy source. Industrial process plants and power generation facilities are a major focus of carbon capture and storage. Advances in separation/processing for oil sands, coal and other minerals have the potential for providing significant environmental benefits across the globe.

As Scientific Director of C<sup>5</sup>MPT, I am proud to present our Annual Review for 2012-2013. Although this is only the second full year of operation as a centre, the strides made towards our goals have been significant. I look forward to helping to build the Canadian Centre for Clean Coal/Carbon and Mineral Processing Technologies into a globally recognized centre for excellence for research, science, and education in the areas of clean coal, hydrocarbon and mineral processing technology.

*Sincerely,*

*Dr. Qingxia (Chad) Liu*

# About Us

## Integrating technology, research and education

Established in 2010 the Canadian Centre for Clean Coal/Carbon and Mineral Processing Technologies (C<sup>5</sup>MPT) is part of the University of Alberta's Faculty of Engineering in the Department of Chemical and Materials Engineering. The Centre is supported by the University of Alberta, the Government of Alberta and a growing number of industry partners. For more information please visit our website: [www.c5mpt.ca](http://www.c5mpt.ca).

Since its inception, C<sup>5</sup>MPT has strived to bring research and education together with the aim to support sustainable and responsible energy and mineral processing development, and the goal of safeguarding Canada's fossil fuel and mineral resources for a global economy.

The Centre is the first of its kind in Canada. Our collaborative operational model brings together industry, government and academic partners in an effort to create a world-class research facility and hub of innovation in clean coal/carbon and mineral processing technologies.

C<sup>5</sup>MPT is founded on the belief that open innovation is both beneficial and necessary in the pursuit of advancements in research and technology. By synchronizing the needs of industry, the interests of the researchers, and the educational requirements of the students, we create exceptional learning opportunities for future scientists and engineers.



## Vision

To become a world-class research centre and innovation hub in clean coal/carbon and mineral processing technologies.

## Mission

To ensure that Canada is a world leader in innovative and responsive development and sustainable growth of a knowledge-based natural resource economy.

## Goals

### Research

Develop technologies for responsible resource processing and utilization.

### Fundamentals of Science

Provide the fundamentals of science and understanding needed for the commercialization of breakthrough technologies that will allow for sustainable development of our natural resources.

### Education

Create an exceptional education and learning environment ensuring the continuing supply of future scientists and engineers.

### Society

Raise public awareness of the technical challenges and opportunities in environmental protection and sustainable development of natural resources in Alberta and Canada.

## Values

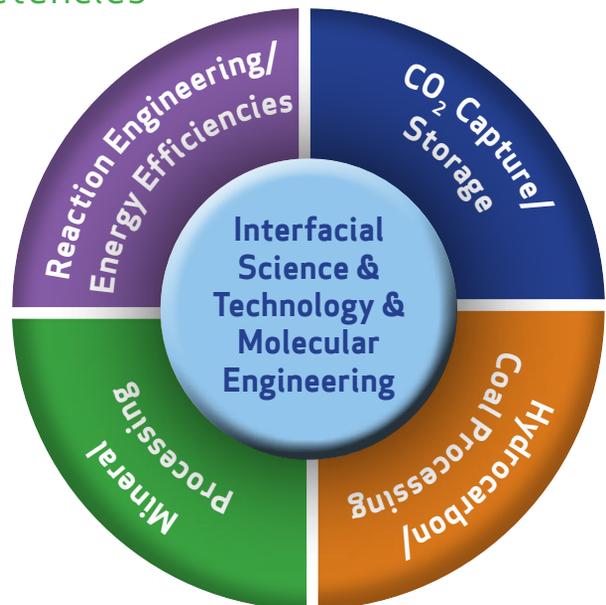
The Centre is founded and guided by the following values:

Innovation, Collaboration, Integrity, Respect, Responsibility, Sharing, Excellence



## Research areas

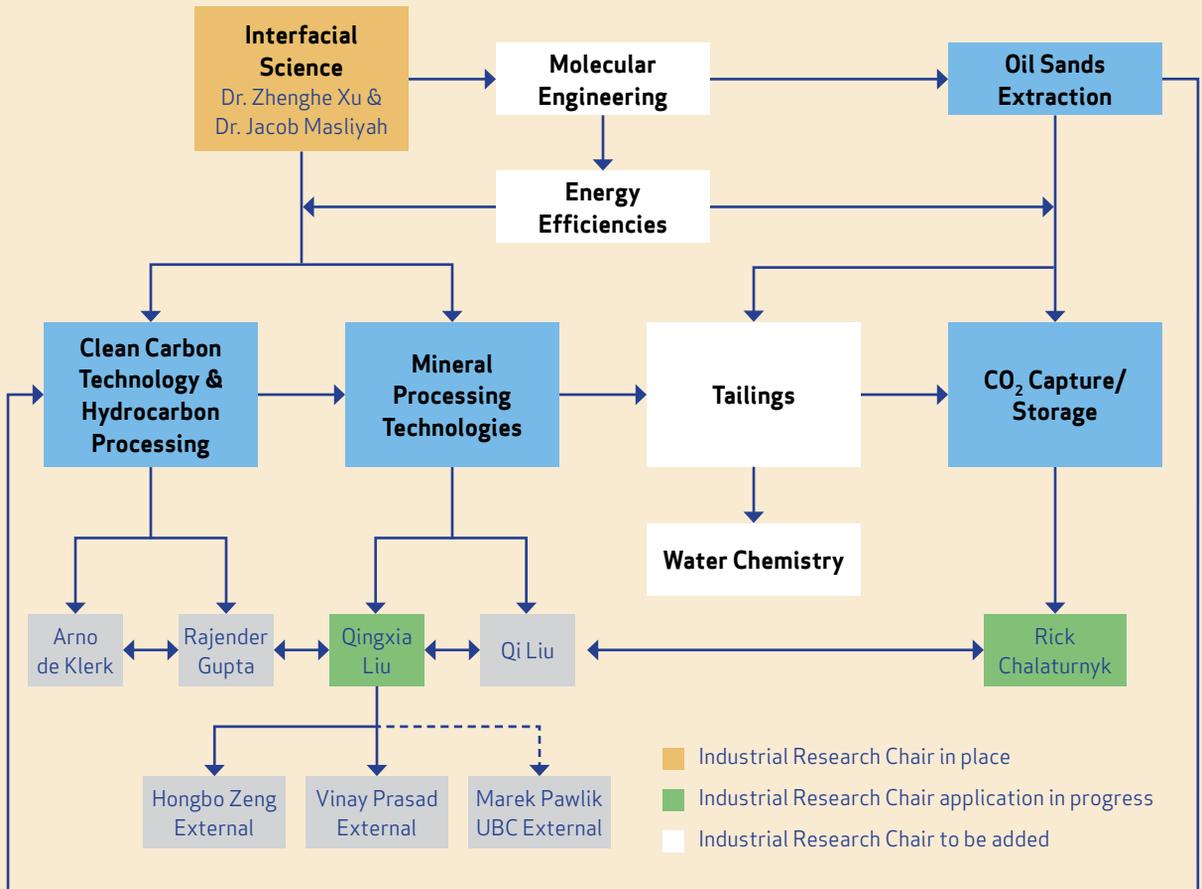
Research at the Centre is aligned to one of four themes: clean coal, mineral processing technologies, carbon capture and storage, and heavy hydrocarbon processing. All of these areas support our core competencies of interfacial science and technology and molecular engineering. Advancing the fundamental and applied understanding of interfacial phenomena related to these research areas will create benefits across all stages of processing in the resource production lifecycle.



**Core Competencies**

C<sup>5</sup>MPT researchers work in an integrated systems approach to address coal beneficiation, water-based oil sands extraction, mineral processing, heavy hydrocarbon/asphaltene processing, and carbon capture and storage technologies, while engaging and collaborating with recognized researchers in these fields.

The following chart illustrates how we have implemented the C<sup>5</sup>MPT Integrated Systems Approach into our operations.



## Our Research Team



**Dr. Qingxia (Chad) Liu** – Scientific Director C<sup>5</sup>MPT

*Professor, Chemical and Materials Engineering*

The key theme of Dr. Liu's research is concerned with how surface and intermolecular forces affect the dispersion and agglomeration of high solid slurries in various industrial processes; such as froth flotation, filtration, dewatering, oil sands extraction, tailing treatment, as well as construction and building materials.



**Dr. Rajender Gupta** – Theme Leader, Clean Coal Technology

*Professor, Chemical Engineering*

Dr. Gupta's research focuses on green energy, particularly greenhouse gas mitigation, clean coal technologies and biomass utilization. He also investigates gaseous pollutants from coal combustion; advanced coal and biomass characterization techniques; mineral matter in coal and thermal performance of boilers; computer aided process design; heat transfer related projects.



**Dr. Rick Chalaturnyk** – Theme Leader, Carbon Storage

*Professor, Geotechnical Engineering*

Dr. Chalaturnyk's specialty is resource geomechanics with a focus on the geomechanics of oil and gas recovery. Currently, he is conducting research in the area of resource geomechanics on: (fundamental properties of consolidated tailings and constitutive Response of coalbeds to CO<sub>2</sub> Sequestration.



**Dr. Zhenghe Xu** – Theme Leader, Water-Based Oil Sands Extraction

*Teck Professor, NSERC Industry Research Chair in Oil Sands Engineering and Canada Research Chair in Mineral Processing*

Dr. Xu's research interests include engineering of nano particles and composites for bio- and environmental applications, interfacial phenomena in minerals and materials processing, surface and interface characterization, advanced combustion technology, mercury emission control in coal combustion, industrial effluent management, fine particle processing, and oil sands processing.



**Dr. Qi Liu** – Theme Leader, Mineral Processing

*Ron Nolan/Hatch Professor of Sustainable Energy and Mineral Process Technologies*

Dr. Liu's field of study is mineral processing and extractive metallurgy. His current research interests are froth flotation and the underlying solution, chemistry, colloid/surface chemistry and electrochemistry issues.



### Dr. Arno de Klerk

*Professor, Chemical Engineering  
Nexen Professor of Catalytic  
Reaction Engineering*

Dr. de Klerk's research interests include the upgrading/refining of alternative carbon sources to fuels and chemicals. Alternative feed materials (non-crude oil) that are considered include oil sands, coal, Fisher-Tropsch syncrude, biomass and waste materials. Central themes that are of interest are oxygenate conversion processes, catalysis and reactor engineering and refinery design.



### Dr. Marek Pawlik

*Associate Professor,  
University of British Columbia  
Norman B. Keevil Institute of  
Mining Engineering*

Marek Pawlik teaches courses on froth flotation, coal preparation, and fine particle processing. He also provides consulting services to the industry on the various aspects of fine particle processing. Since 2002, he has authored or co-authored over 30 refereed journal and conference articles.



### Dr. Hongbo Zeng

*Assistant Professor, Chemical &  
Materials Engineering*

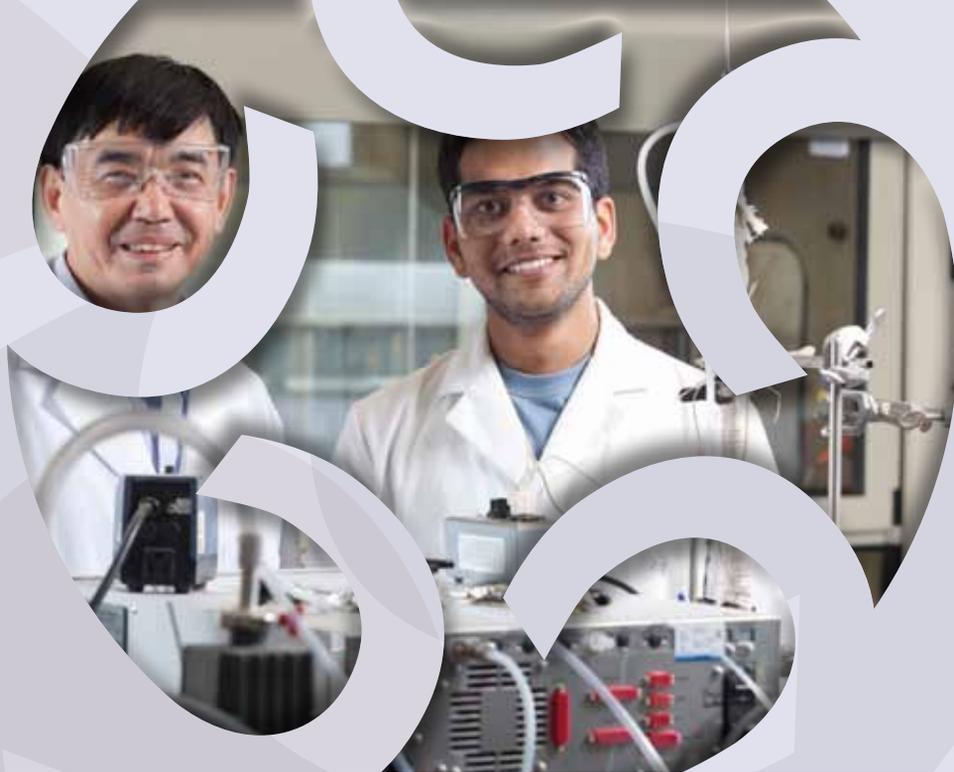
Dr. Zeng received his B.S. and MSc from Tsinghua University, and PhD in Chemical Engineering from the University of California, Santa Barbara. His research interests include surface and colloid science, nanotechnology, with a special focus on the intermolecular and surface interactions in polymer materials, complex fluids, mineral processing, oil sands engineering and biological systems, and development of advanced functional materials with novel engineering and environmental applications. His group uses state-of-art techniques such as surface forces apparatus (SFA) and atomic force microscope (AFM) to directly probe the molecular forces at solid/oil/water/gas interfaces.



### Dr. Vinay Prasad

*Associate Professor, Chemical and  
Materials Engineering*

Vinay Prasad's research interests include modeling, optimization and control, with applications in froth flotation, reservoir engineering, catalysis, reaction engineering and coal bioconversion. Specific areas of interest include multiscale modeling, dynamic reconciliation of process models with data, parameter estimation and model reduction.



## Current Projects

### Clean Coal – Basic Research

*Dr. Arno de Klerk, Professor, Chemical and Materials Engineering:*

- Selective Coal Catalysis
- New Approaches to Direct Coal Liquefaction
- Carbon Capture Technologies: Oxy-Fuel and Post-Combustion Capture

*Dr. Qingxia Liu, Professor, Chemical and Materials Engineering:*

- Characterization for Optimal Processing and Utilization

### Clean Coal – Applied Research

*Dr. Rajender Gupta, Professor, Chemical and Materials Engineering:*

- Coal Upgrading – Reducing Minerals and Drying
- Gasification and Hot Gas Cleanup
- Underground Coal Gasification and Carbon Storage in Residual Coal

### Mineral Processing Technologies – Basic Research

*Dr. Vinay Prasad, Professor, Chemical and Materials Engineering:*

- Flotation Froth Modeling and Control (New Project for 2012-2013)

*Dr. Hongbo Zeng, Professor, Chemical and Materials Engineering:*

- Molecular Interaction in Sulphide Mineral Flotation (New Project for 2012-2013)

*Dr. Marek Pawlik, Professor, University of British Columbia:*

- Role of Long Chain Collector in Flotation (New Project for 2012-2013)

### Mineral Processing Technologies – Applied Research

*Dr. Qi Liu, Professor, Chemical and Materials Engineering:*

- Xanthated Polyacrylamide (PAM-X) in Sulfide Flotation

### Mineral Processing Technologies – Exploratory Research

*Dr. Zhenghe Xu, Professor, Chemical and Materials Engineering:*

- Novel Collectors for Selective Sulfide Flotation

### Carbon Capture and Storage – Applied Research

*Dr. Rick Chalaturnyk, Professor, Geomechanical Engineering:*

- Reservoir-Geomechanical Elements of Underground Coal Gasification



## Partnering with Industry

The **opportunities** offered to our researchers and students are due in part to the generous endowment support from our **industry partners**:



This industry funding, as well as a grant from Alberta Innovates – Energy and Environmental Solutions and outstanding support from the University of Alberta and the Faculty of Engineering, enables us to engage in high-level technical research of considerable breadth. In 2012, C<sup>3</sup>MPT disbursed \$1.2 million to nine leading researchers in support of thirteen diverse projects. These projects enlisted the help of 34 full-time highly qualified personnel (HQP) – undergraduate and graduate students, postdoctoral fellows and technical staff.

Our industry sponsors' contributions to the Centre's work and success cannot be overstated. They are directly involved in strategic planning and their goals guide the direction of our research. Industry involvement in the early

stages of technology has created opportunities for scientific breakthroughs with industry uptake and development. Industry participation in collaborative research provides many educational activities that have countless benefits to students such as periodic visits to industry sponsors' work sites. This benefits students in that they see real-world examples of the challenges faced and have the opportunity to converse with industry leaders. In turn, companies are given the chance to meet budding engineers with an interest in helping to address industry issues.

Our sponsors are directly involved in the decision making process regarding the strategic direction of the Centre through membership on the Management Advisory Board (MAB) and the Scientific Advisory Committee (SAC).

# Governance

C<sup>5</sup>MPT has two governing bodies: the Management Advisory Board (MAB) and the Scientific Advisory Committee (SAC). Both bodies comprise of representatives from each industry sponsor, the University of Alberta, and the Government of Alberta.

The MAB provides strategic direction for research, monitors progress, approves budgets, and oversees the operational management of the Centre. The SAC reviews projects from inception to conclusion. It sets research priorities including putting out calls for research proposals and screening the proposals to ensure new projects complement existing work and the Centre's overall strategic direction.

## Current Members of the Management Advisory Board

**Bryan Rairdon**, Interim Board Chair, Manager, Project Metallurgy, Teck Metals Ltd.

**Steve Wollin**, Director: Engineering, Capital Power

**Sanjiv Save**, Director: XTL and Upgrading, Hatch Ltd.

**Tom Harding**, Corporate Technology Senior Advisor, Nexen

**Duke Anderson**, President & CEO, Foundation CMG

**Steve Flewelling**, VP Project and Exploration, Xstrata

**Eddy Isaacs**, CEO, Alberta Innovates-Energy and Environment Solutions

**Les Little**, Executive Director, Energy Technologies, Alberta Innovates-Energy and Environment Solutions

**David Lynch**, Dean, Faculty of Engineering, University of Alberta

**Fraser Forbes**, Chair, Dept. of Chemical and Materials Engineering, University of Alberta (ex-officio)

**Qingxia Liu**, Scientific Director, C<sup>5</sup>MPT, University of Alberta (ex-officio)

## Current Members of the Scientific Advisory Committee

**Sanjiv Save**, Interim Committee Chair, Director: XTL and Upgrading, Hatch Ltd.

**Juris Harlamovs**, Section Leader, Copper and Zinc, Teck Metals Ltd.

**Mick Moore**, Senior Manager, Sustaining Capital, Capital Power

**Nestor Zerpa**, Senior Process Technology Advisor, Synthetic Oil Division, Nexen

**Long Ngheim**, VP Research and Development, Foundation CMG

**Vijay Shrivastava**, Senior Staff Engineer, Computer Modelling Group Ltd, Foundation CMG

**Les Little**, Executive Director, Energy Technologies, Alberta Innovates-Energy and Environment Solutions

**Duke du Plessis**, Alberta Innovates-Energy and Environment Solutions

**Steven Dew**, Associate Dean, Research and Planning, Faculty of Engineering, University of Alberta

**Phillip Choi**, Associate Chair-Research, Chemical and Materials Engineering, University of Alberta

**Jacob Masliyeh**, Professor Emeritus, Chemical and Materials Engineering, University of Alberta

**Dominic Fragomeni**, Director, Xstrata Process Support, Sudbury, Xstrata

**Qingxia Liu**, Scientific Director, C<sup>5</sup>MPT, University of Alberta (ex-officio)

## 2012-2013 Accomplishments

C<sup>5</sup>MPT strives for a standard of **excellence** and **growth** in all areas of our operation. Our research portfolio has expanded, our student base has grown, our endowment sponsorship has increased and important strides toward other **international collaborations** are being taken. We are proud of our accomplishments and we are pleased to share the highlights of the 2012-2013 fiscal year.

## Our Research Portfolio 2012-2013

With the addition of three new researchers in 2012, the Centre has grown to a total of nine distinguished researchers who supervise 34 students, postdoctoral fellows and technical staff who are all supported by C<sup>5</sup>MPT-funded projects. Additionally, over 110 associated students (who are not supported by C<sup>5</sup>MPT funding) are supervised by our researchers and benefit from the knowledge dissemination and open innovation model. C<sup>5</sup>MPT is currently working on 13 diverse projects on topics of coal research, mineral processing, and carbon capture and storage, which cover basic, applied and exploratory phases of research.

# Maximizing Facilities

As part of the University of Alberta, the Centre has access to the National Institute of Nanotechnology (NINT), the Alberta Centre of Surface Engineering and Science (ACES) and the Oil Sands and Coal Interfacial Engineering Facility (OSCIEF) in addition to our own facilities and equipment. The world-class nano-microscopy and nano-spectrographic capabilities greatly enhance our research capabilities. We also have access to the array of other research labs in the University of Alberta's Faculties of Engineering and Science.

## C<sup>5</sup>MPT's facilities include:

### Clean Coal Research Laboratory

Supporting clean coal research, the Coal Research Laboratory includes ultrafine grinding capability and ovens, furnaces and reactors for drying, ashing, digesting and burning coal samples. Equipment for spectrometry, gas chromatography, carbon analysis, sulphur analysis, and mercury analysis provide characterization of results.

### Mineral Processing and Oil Sands Extraction Laboratory

Within the mineral processing and oil sands related research areas, facilities include: bench-scale flotation and separation equipment and extensive capability for analysis at a molecular level to further understanding of fundamental surface and interfacial processes such as attachment behaviour, charge, drop shape, surface tension, interfacial tension and contact angle. This includes advanced equipment for Atomic Force Microscopy, particle sizing and distribution, infrared spectrometry, Langmuir interfacial trough analysis, and optical and fluorescence microscopy. Our research capabilities will be enhanced by the addition of a Mineral Liberation Analyzer in July 2013. This purchase is a result of the collaboration of six researchers from various departments in the Faculty of Engineering and is one concrete example of the collaborative research model that has proven so successful over the past two years.

Additional custom University of Alberta designed instrumentation allows analysis of liberation and aeration behaviour during mineral processing and induction time of gas/gas, gas/material and material/material attachment time.

### Carbon Capture and Storage Laboratory

Aligned with the carbon capture and storage theme, the associated Geomechanical Reservoir Experimental Facility (GeoREF) provides extensive instrumentation to study flow behaviour and pore volume change and its effect on permeability. GeoREF will be configured with multiphase flow systems both upstream and downstream of triaxial cell testing environments in order to permit multiphase flow experiments under realistic stress, deformation and temperature conditions. A new two-metre radius platform beam centrifuge, the first of its kind in Western Canada, with a maximum acceleration level of 280 rpm (150 g) and maximum payload of 500 kg has been installed in GeoREF. It will permit thermohydraulic-geomechanical behaviour to be studied at an intermediate scale between the small "element" test specimens in triaxial cells and the field (reservoir) scale response. GeoREF will establish the first experimental infrastructure in Canada that allows time lapse seismic measurements to be conducted up to temperatures of 350°C and under conditions of multiphase fluid flow, such as gaseous or supercritical phase CO<sub>2</sub>.

# 2012-2013 Educational Excellence – Beyond the Classroom

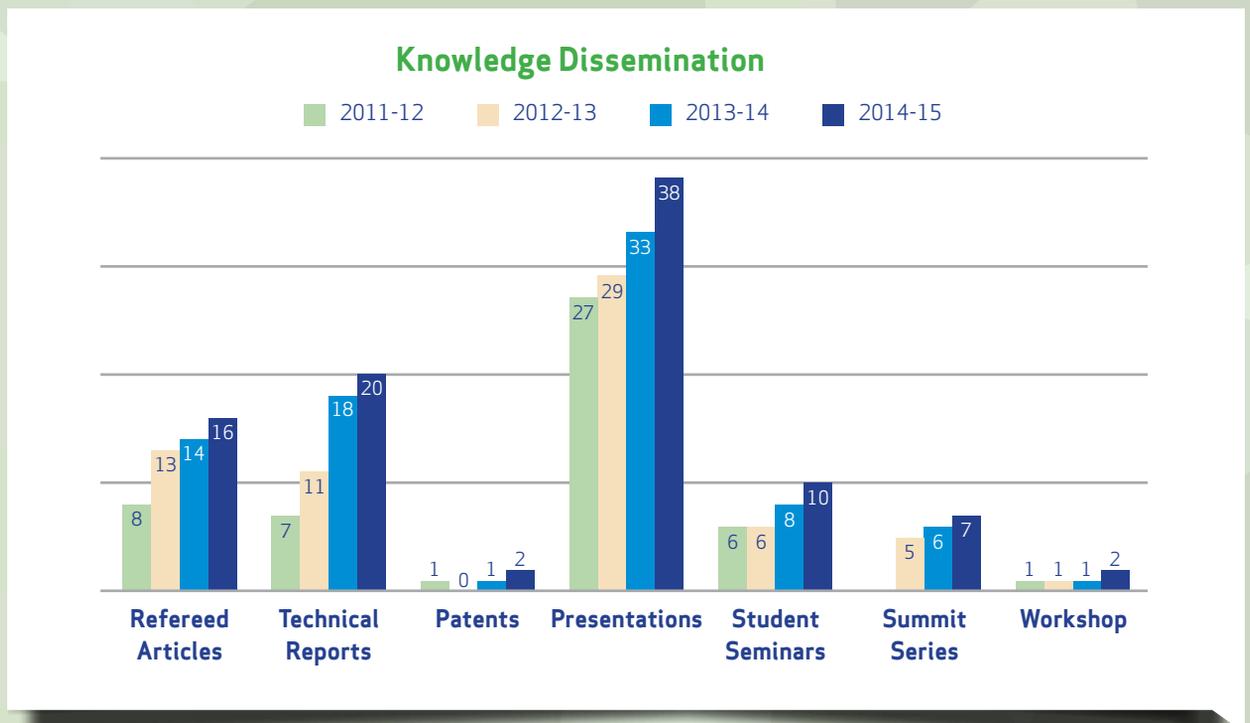
Education gained in traditional ways is critical to success. But learning achieved beyond the classroom can be just as significant. At C<sup>5</sup>MPT, students are encouraged to submit papers and posters, and to attend conferences all over the world with destinations including India and Japan. The importance of publishing research papers in journals is another key focus. These suggestions are taken quite seriously as the following statistics attest. The number of highly qualified personnel and their productivity has grown and will continue to do so in the foreseeable future. During the 2012-2013 academic year, 34 dedicated students produced 13 refereed papers, 11 technical reports and 29 conference posters and presentations. Also, one patent application has been submitted. Six student seminars were sponsored by C<sup>5</sup>MPT over the term with an average attendance of between 40 and 50 people. Students gain invaluable experience presenting their work to an audience made up of their peers, professors and industry sponsors.

C<sup>5</sup>MPT hosted world-leading international researchers to the University of Alberta to lecture, meet, discuss, and

interact with faculty and students for our flagship initiative, the Summit Speakers Series. At various times between April 2012 and March 2013, Dr. Jan Miller from the University of Utah, Dr. Cyril O'Connor from the University of Cape Town, Dr. Roger Smart from the University of South Australia (twice), Dr. Andrea Gerson from the University of South Australia and Dr. Janusz Laskowski from the University of British Columbia visited for one week. Collectively they presented a total of 10 lectures and provided nearly 250 hours of one-on-one consultations. These events allow tremendous cross-fertilization of research findings, collaborative ideas and exceptional opportunities for students and faculty members alike.

The first production of the C<sup>5</sup>MPT “Road Show” took place in October 2012 when five students, one postdoctoral fellow, and three theme leaders (professors) travelled to Trail, British Columbia to Teck Metals Ltd. This program allows students to showcase their work to industry sponsors and gives industry members the opportunity to meet C<sup>5</sup>MPT highly qualified personnel.

The following chart shows past and projected knowledge dissemination activities:



## Our Newest Sponsor

On October 1, 2012, Dr. David Lynch, Dean of the Faculty of Engineering and Ian Pearce, CEO of Xstrata Nickel, announced Xstrata's \$3M endowment contribution to C<sup>5</sup>MPT. Xstrata's Steve Flewelling and Dominic Fragomeni have added a great deal of expertise to our Management Advisory Board and Scientific Advisory Committee and have provided valuable resources and connections for the global promotion of C<sup>5</sup>MPT. The competition and recruitment of the Xstrata Chair in Mining and Mineral Processing Engineering is to take place in 2013.



## International Collaborations

### Alberta-Tsinghua Joint Proposal Workshop

From May 1 to 3, 2012, C<sup>5</sup>MPT hosted a very successful workshop involving over fifty participants. The attendees included thirteen professors from Beijing's Tsinghua University along with faculty from the Department of Chemical and Materials Engineering, the Department of Civil and Environment Engineering, the Alberta School of Business, the China Institute, and the School of Energy and the Environment at the University of Alberta. Also in attendance were representatives from the Government of Alberta, Suncor, Syncrude, Tervita, Nexen, Capital Power, Hatch, and the Edmonton Economic Development Corporation. Dr. Lorne Babiuk, Vice-President of Research, and Dr. David Lynch, Dean of the Faculty of Engineering brought greetings from the University of Alberta, and Dr. Li Zheng, Dean of the Department of Thermal Engineering, responded on behalf of Tsinghua University. The workshop centred on four themes:

1. Coal Utilization and Gasification
2. Carbon Capture, Utilization and Storage
3. Water and Environment
4. Energy Policy and Economics and System Engineering.

One professor from each University served as leader for each theme and groups were formed to address the issues faced by their particular area of concentration. The sessions were filled with thought-provoking challenges and ambitious commitments for collaboration and mutually agreed upon projects.

On February 18 and 19, 2013, a delegation of over 25 professors from various faculties at the University of Alberta were invited to Tsinghua University for a follow-up workshop to further the efforts and work towards implementation of the projects. We are confident that an agreement is forthcoming in the near future.

### On the Horizon

During the past year the Scientific Director travelled to meet with numerous potential sponsors and collaborators. Several international delegations also visited our Centre and more are expected in the near future. We continue to cultivate relationships with Japan Coal, the Helmholtz Alberta Initiative, France (France-Alberta Science and Technology Initiative or FAST), Freiburg in Germany, Science without Borders in Brazil (in conjunction with the Government of Alberta, Government of Canada and the Edmonton Economic Development Corporation), and most recently China Huadian Heavy Industries Co. Ltd. Representatives from the Centre attended a series of meetings at the invitation of CORFO, the Chilean National Economic Development Agency. CORFO's goal is the development of International Centres of Excellence in Chile. The meeting opened several avenues to explore and develop for C<sup>5</sup>MPT and the University of Alberta. The U of A will be signing an agreement with Chile's National Post-secondary Education Commission for educational exchanges and internships in the near future.

## Enhancing our Future

The educational experience and success of our graduate students and postdoctoral fellows is paramount. In order to further education and outreach in the coming years, the Centre will be undertaking multiple initiatives to augment current activities. The quality of research depends upon students' exposure to world-class scientists. Investing in our students' success and development will ensure the continuity and growth in our area of research. The key initiatives we will continue and/or implement over the next year include the continuation of the Summit Speaker Series and the establishment of an Educational Advisory Committee.

### Summit Speakers Series

We have invited several speakers for the 2013-2014 fiscal year. Dr. Hans-Jürgen Butt from the Max Planck Institute for Polymer Research in Mainz, Germany will be spending July 15 to 18, 2013 at the centre. Dr. Roe Hoan Yoon, Professor from Virginia Tech will also be here from July 15 to 19, 2013. Dr. Jaroslaw Drelich, Professor at Michigan Technological University will be at C<sup>5</sup>MPT from July 22 to 26, 2013 and we are finalizing arrangements with several others. We plan to increase the number of internationally-renowned researchers who will speak to faculty, students and invited visitors. This will ultimately increase the awareness and reputation of the Centre internationally. We are exploring the possibility of having the Summit Speakers Series lectures recorded and posted on our website ([www.c5mpt.ca](http://www.c5mpt.ca)) in order to give more people access to the knowledge and advances in technology being presented.

### Education Advisory Committee

With the support and encouragement of our sponsors we are in the process of establishing an Education Advisory Committee. This committee will be modelled upon a similar initiative used in the School of Mining and Petroleum Engineering at the University of Alberta that has proven to be very successful.

The purpose of the committee is to:

- Provide advice, guidance and support to C<sup>5</sup>MPT in the delivery of our educational mandate of training highly qualified personnel;
- Identify industry needs with respect to the knowledge and skills required for future engineers;
- Identify sector specific information and trends on employment opportunities;
- Advise and assist the Centre in initiating "beyond the classroom" learning from experiences such as professional and technical development for engineers in the workforce.



## What's Next for C<sup>5</sup>MPT?

The Centre has achieved considerable success in the last year in research, education and the addition of new sponsors. The Key Performance Indicators are a demonstration of our team's educational accomplishments. Our continued success will be measured by the Centre's ability to maintain this momentum and expand the research, educational and collaborative partnership aspects of our mandate. Our reputation for excellence in science is predicated on retaining and attracting the best faculty members and the brightest students. We will continue our efforts as we complete our first three years of operation in March 2014 and sustainability will be a key to the success of the Centre. The addition of six new chairs is proposed to help achieve our long-term objective of becoming a world-class, internationally recognized research centre in clean coal/carbon and mineral processing technologies. As our sponsor funding base increases, and when funding permits, we hope to have the opportunity to implement additional faculty chairs in the following research areas:

- Xstrata Chair in Mining and Mineral Processing Engineering: 2013-2014
- 1-2 Chairs in Coal/ Hydrocarbon/Fluid Flow: 2014-2015
- 1 Chair in Energy Efficiency: 2015-2016
- 1 Chair in Water Chemistry: 2016-2017
- 1 Chair in Molecular Engineering: 2017-2018

At the C<sup>5</sup>MPT Management Advisory Board meeting in February 2013 members established that it would be beneficial to advance to the next stage of development – that is, moving from the inception stage of operations to a fully mature research and educational organization. C<sup>5</sup>MPT is on the leading edge of sustainable and responsible environmental technology development. Our principle objectives since the Centre's launch – to become recognized globally as a centre for excellence for research, science, and education in the areas of clean coal, hydrocarbon and mineral processing technology have not wavered. The work we are doing today will have far reaching benefits for Canada, North America and the world. Together we can help build a safer, more sustainable tomorrow.



**(C<sup>5</sup>MPT)** Canadian Centre for Clean Coal/Carbon  
and Mineral Processing Technologies



Department of Chemical and Materials Engineering  
University of Alberta  
7<sup>th</sup> Floor Electrical and Computer Engineering  
Research Facility (ECERF)  
9107-116 Street  
Edmonton, Alberta T6G 2V4  
780-492-1375

**For more information, please visit  
our website at [www.c5mpt.ca](http://www.c5mpt.ca)**

