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Centre de recherche sur les matériaux auto-assemblés
Centre for self-assembled chemical structures

Volume 29

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1) Annual Report 2010-2011

Background: CSACS/CRMAA receives funding from FQRNT under the Regroupement Stratégique Programme which began as of January 2002 and ran for 6 years. CSACS/CRMAA became an official McGill Centre in February 2003. Renewal funding of \$412,500 p.a. for 6 years from the FQRNT Regroupement Stratégique Programme was awarded to CSACS/CRMAA in April, 2008.

The Centre governance involves three groups: the Governing Board, the International Advisory Committee (IAC), and the Research Activities Committee (RAC). The membership of these Committees (Appendix 1) is as prescribed by the McGill Centre regulations and the guidelines set out by FQRNT.

Director: According to the McGill rules for Centres, the member appointed as Director can serve a maximum of two 3 year terms. Since September 1, 2009, Prof. Theo van de Ven, Department of Chemistry, McGill, is the new Director of CSACS/CRMAA.

Centre Activities: 2010-11

The complete list of CSACS/CRMAA activities over the last 9 years can be found on the Centre website, www.csacs.mcgill.ca. A monthly bulletin is published by the coordinator, Petr Fiurasek, to provide information about upcoming and ongoing activities, recent publications and awards. In addition to being distributed by e-mail, the bulletin can be downloaded from the centre website.

1. Centre Membership: Following the renewal of FQRNT funding, CSACS/CRMAA currently has 32 full, 4 associate and 2 collaborator members from 6 Quebec universities. The following researcher was nominated as a Industrial collaborator and approved for membership in 2010:

Dr. Shan Zou, NRC, Ottawa. Her research is mainly focused on molecular level visualization, sensing (by force), manipulation, and control of mechanical protein unfolding, protein-lipids interactions, supramolecular assembly, as well as polymeric materials on the nanometer scale using self-assembly and atomic force microscopy (AFM)-based platforms.

Prof. Jorge Vinals has left CSACS in Fall. Reason: New faculty position at University of Minnesota.

Annual Report (2010-2011) con't.

2. Scientific Activities sponsored by CSACS/CRMAA:

a. Course and Workshops

Workshops	Date	Speakers/Affiliation
LC-ICP-MS, HPLC Attendance: 25	Oct. 27, 2010	Chady Stephan, Miles Snow Perkin Elmer

b. CSACS/CRMAA lecture series 2010-2011

Here are the 7 speakers who gave lectures at 5 of the participating universities. In addition, CSACS/CRMAA publicized other departmental speakers whose research was of strong interest to its members. The seven speakers and the universities where they lectured are listed below:

Sept. 20/21, 2010 Prof. Markus Lackinger , Ludwig-Maximilians University, Munich. Self-Assembly of Tritopic Building Blocks-Tuning Interaction Strength INRS / McGill

Oct. 12, 2010 Prof. Colin Nuckolls , U. of Columbia. From Molecules to Materials McGill

Jan. 24/25/26, 2011 Prof. George Shimizu , U. of Calgary Metal organic frameworks for clean energy applications Sherbrooke/ McGill /UdeM

March 7/8/9, 2011 Prof. Fraser Stoddart U. of Northwestern Nanoporous Carbohydrate Frameworks INRS/ McGill /Sherbrooke

March 15/16, 2011 Prof. Jeffrey Moore U. of Illinois Mechanoresponsive Materials McGill /UdeM

March 29/30/31, 2011 Prof. Johan Hofkens K.U.Leuven. University Single molecule fluorescence microscopy, a versatile tool to study dynamics McGill/Concordia/Sherbrooke

April 11/12/13/14, 2011 Prof. Jay Siegel U. of Zürich Design and Synthesis of Topological Constructs Laval/ McGill /Sherbrooke/UdeM

Annual Report (2010-2011) con't.

b. CSACS/CRMAA lecture series 2010-2011 con't

The CSACS/CRMAA lecture series was coordinated by Louis Cuccia (Concordia U) as the chair of the Education & colloquia committee (Perepichka, Skene, Fiurasek). For this year, Rolf Schmidt and Louis Cuccia had set up online request for 2011/2012. This was a very efficient way in terms of suggestions. Here is the list of speakers that are plan for 2011/2012 Seminar Series:

1. Vicki Meli (student symposium, former CSACS student) (Cuccia & Lennox, McGill)

Tuesday September 20 - McGill

Wednesday September 21 - Concordia

2. Paul Weiss (Blum, McGill)

Monday September 26 - INRS

Tuesday September 27 - McGill

Wednesday September 28 - Udm

3. Sergiy Minko (Winnik, Udm)

Monday October 17 - Sherbrooke

Tuesday October 18 - McGill

Wednesday October 19 – UdeM

4. Elias Vlieg

Tuesday November 1 - Concordia University

Wednesday November 2 - Udm

(Cuccia, Concordia)

5. Michael Drain (Hanan, Udm)

Wednesday November 30 – Udm

Thursday December 1 – Sherbrooke

6. Francesco Stellacci (Rosei, INRS)

Monday March 12 - INRS

Tuesday March 13 – McGill

Annual Report (2010-2011) con't.

c. CSACS/CRMAA Annual Meetings

2010 Annual Meeting, Concordia, May 6, 2010 (Thursday)

The 2010 Annual meeting was organized by Louis Cuccia, Dima Perepichka, Rolf Schmidt and Petr Fiurasek. The Eurocore research cluster, Self-Organized Nanostructures (SONS 2), sponsored the travel for 3 speakers and thus making it possible to invite 3 international speakers in addition to two more local speakers. Prof. Klaus Kern (Max-Planck-Institut, Germany) was one of the 3 international speakers but unfortunately he did not attend due to health issues. 189 members and visitors attended and students presented 41 posters. Rolf Schmidt made a new website for the annual meeting which will be used this year as well.

The keynote lectures were:

Flemming Besenbacher (Interdisciplinary Nanoscience Center Aarhus University, Denmark)

Dynamics of nanostructures: Diffusion, self-assembly, self-organization, DNA molecules and nano-boxes.

Mario Ruben (Institute of Nanotechnology, Germany)
Supramolecular spintronic devices.

Adi Eisenberg (McGill University, Canada)

Novel hemispherical block copolymer morphologies from collapsed vesicles (kippah vesicles).

Guojun Liu (Queen's University, Canada)

A block copolymer approach to architectural polymers.

2011 Annual Meeting, McGill, New Residence, May 5, 2011 (Thursday)

This year's Annual meeting is organized by Louis Cuccia, Dima Perepichka, Will Skene, Rolf Schmidt and Petr Fiurasek.

The invited speakers are:

Luis Echegoyen, University of Texas at El Paso (Dima, McGill)

George Newkome Akron (Zhu, UdeM)

Shan Zou NRC Ottawa (Fiurasek, McGill)

Mohan Srinivasarao Georgia Tech (Rey, McGill)

Next year (2012) the CSACS will celebrate **10th anniversary**.

Annual Report (2010-2011) con't.

d. CSACS/CRMAA Student Symposium, U. de M., Sept. 14, 2011.

The 6th CSACS/CRMAA Student Symposium, held at the Pavilion J.-A. Bombardier de l'Université de Montréal, was attended by 87 students. Nine 20 minute talks and 26 posters were presented. The conference was organized by Iryna Perepichka, Gwen Bazin, Olga Borozenko and Stephane Dufresne from U. de M and by Andrea Greschner, Zahid Mahimwalla and George Rizis from McGill and by Rolf Schmidt (Concordia U.) and by the CSACS coordinator. This year the students had decided to invite a FQRNT speaker, Annik Brosseau. The 2010 speakers and the lecture titles of the 2010 symposium are listed below. The 2011 student symposium will be held at McGill.

Eric Dionne (UQAM) Electrochemical study of binary ferrocenealkylthiol SAMs containing different surface concentrations and phase states of ferrocene.

Jonathan Hiltz (McGill University) Nanoplasmonic phytoliths.

Xin Wang (Université de Montréal) Study on supramolecular, photo-responsive, recyclable elastomers.

Andrea Greschner (McGill University) The effect of synthetic molecules on DNA self-assembly: Error correction and dramatic changes in assembly products.

Yuping Zhang (McGill University) Liquid crystal phase formation in nanocrystal cellulose suspension: a laser diffraction study.

Invited speaker: **Annik Brosseau, FQRNT**, overview of the different scholarship programs

Olivier R. Bolduc (Université de Montréal) Extending peptide based self-assembled monolayers to drug efficiency screening.

Bin Huang (McGill University) Multilayered polymer nanotube and their dispersions.

Amine Fourati (Université de Montréal) Using self-assembly of molecular probes for the detection of time, temperature changes, and deformation of polymers.

Blythe Fortier-McGill (McGill University) ^1H and ^{13}C MAS NMR study of the hydrogen bond network of PMAA complexes and multilayers

Annual Report (2010-2011) con't.

e. CSACS/CRMAA Mini Symposia

Feature lectures by CSACS professors on recent research developments. In summer the Mini-Symposium is usually plan so that the visiting scientist can participate.

July 14, 2010 (McGill University)

Speakers:

Amy Blum, McGill U. Chemical Sensing with Molecular Electronics.

Peter Skabara (Visiting scientist), U. of Strathclyde, Glasgow, UK

Tweaking the electronic properties of conjugated materials by molecular design: from fused-core structures to non-covalent interactions.

f. CSACS/CRMAA Scientists-in- Residence

Peter J Skabara, Professor of Materials Chemistry, University of Strathclyde. Prof. Skabara, was our visiting scientist from June 17 to July 16, 2010. He was hosted by the laboratory of Dima Perepichka. His research interests are based on the synthesis and characterisation of electroactive molecules and macromolecules. Applications for these materials include plastic solar cells, electronic displays, field effect transistors, sensors and plastic batteries. His intention for the proposed visit was to publish the output of any joint work and to establish possible strategies for more formal and funded collaborative projects. One of his PhD students has spent 3 months in the labs of Will Skene, so he followed up on this collaboration during his visit. He was also interested to meet and discuss potential exchange visit with groups of Gary Hanan and Hanadi Sleiman.

4 visits for this summer:

Klaus Meerholz from the University of Cologne. Host by Will Skene.(July-August 2011)

Tapani Viitala from University of Helsinki. Host by Francoise Winnik. (May-July 2011)

Rodrigo Palacios from National University of Río Cuarto, Córdoba, Argentina. Host by Gonzalo Cosa. (Summer 2011)

Marco Sangermano from Politecnico di Torino, Italy. Host by Mark Andrews. (Aug.-Sept.15, 2011) .

Annual Report (2010-2011) con't.

g. CSACS/CRMAA Summer Students

In 2005, CSACS/CRMAA initiated a new program to support 5-7 undergraduate summer students (\$4K per student) to work on joint research projects between Centre members. The goals of the program are to expose undergraduate research students to CSACS/CRMAA research as well as to promote contacts between research groups. Interuniversity projects are encouraged. Getting more and more popular every year, this year we have received a record of 16 applications. The students selected for the 2011 program are listed below:

1. Nadime Salamé Concordia Cuccia/Hanan
Synthesis and surface properties of heterocyclic foldamers and their interaction with metal ions as probed by scanning tunnelling microscopy
2. Fei Chen Concordia DeWolf/Cuccia
Self-assembly of long chain zwitterionic quinones at the air-water interface
3. Verbois Clémence Toulouse, France Kakkar/van de Ven
Synthesis of miktoarm polymers with varied arms for encapsulation of biologically active molecules
4. Adriano Vissa McGill DeWolf/Cuccia
Surface characterization of thiol-responsive degradable amphiphilic block copolymers
5. Emma Mungall McGill Reven/Lennox
Characterization of gold nanorods functionalized with mesogenic ligands
6. Nicholas McGregor McMaster Skene/Hanan
Investigation of solid phase inorganic sensors
7. Rachelle Choueiri McGill Perepichka/Rosei
Self-assembly of fullerenes functionalized with carboxylic acids
8. David Levan McGill Perepichka/Blum
Development of analogous "molecular diodes" with thiol functionality attached to a donor/acceptor fragment

Annual Report (2010-2011) con't.

h. CSACS/CRMAA Sponsored Symposia:

Upcoming major meetings in Montreal that will feature CSACS/CRMAA sponsored symposia and other scientific events:

Supramolecular Chemistry **Zing** Conference 2011 (Egypt): sponsor \$2000

ACS Colloid and Interface Meeting, Montreal, June 19 – 22, 2011, organized by Theo van de Ven. Four of the sessions will be chaired by CSACS/CRMAA members (van de Ven, Reven, Kakkar, Lennox). Poster session organized by Petr Fiurasek and Kevin Wilkinson: sponsor \$600

Canadian chemical society conference 2011(**CSC**, Montreal): June 5–9, 2011, Elite Sponsor = \$5500.

Sponsored 7 symposia.

MT1/MS1: Block copolymer Self-Assembly (in honor of Adi Eisenberg); chair:

Guojun Liu; 4 sessions – \$2500.00

MT2/OR9/BM18: Supramolecular Materials; co-chairs: H. Sleiman, A. Schmitzer;

4 sessions - \$500.00

MT3/SS7 or SS4/MS6: Self-Assembly at Surfaces and Interfaces; co-chairs: H.

Eichhorn, D. Perepichka, S. Giasson; 4 sessions; - \$500.00

MT4/MS2: Smart Stimuli-Responsive Materials; chair: Yue Zhao; 2 sessions; Monday AM/PM - \$500.00

SS2/PT10: Organic Ultrathin Films and Biomimetic Interfaces (C. DeWolf); 3 sessions - \$500.00

MS7: Optoelectronic Materials (W. Skene); 5 sessions - \$500.00

Metallo-supramolecular Chemistry (Garry Hanan) \$500.00.

Annual Report (2010-2011) con't.

j. Stage International FQRNT

The international internships of the Fonds Nature et Technologies aim to foster the international mobility of Master's and PhD students whose research activities are part of the scientific program of a strategic cluster. Two students (four in total, two last year) have received the scholarship this year.

Mihaela Cibian (Garry Hanan): (5 000\$) March-May, 2011, Fukuoka, Japan. She joined the research group of Prof. Ken Sakai at Kyushu University in Fukuoka Japan, to work on self-assembled metal complexes for hydrogen production. It was delayed for this summer due to the earthquake.

Daniel Chartrand (Garry Hanan): (5 000\$) July-August, 2010, Erlangen, Germany. He joined the research group of Prof. Sven Rau at University of Erlangen-Nurnburg in Erlangen, Germany, to work on self-assembled metal complexes for hydrogen production.

Four more scholarships are available for CSACS students in 2010-2013. One was already awarded to Ori Gidron from Weizmann Institute of Science (Tel-Aviv, Israel) who will be working in Prof. Perepichka lab for two months this summer. CSACS still has three scholarships to be granted. Those interested are invited to consult the [rules](#).

k. Encouraging Commercializable Outcomes (ECO) Grants

Purpose: To fund small projects, led by a CSACS principal investigator, which objective is to demonstrate or strengthen proof-of-principle for a CSACS research-based invention. Successful projects are expected to lead to results with strong commercialization potential.

Amount of funding: \$20,000 max per project (direct research costs only).

Project time frame: 1 year

Applications: Cover page + 2 pages max.

Adjudication: By members of Industrial Innovation Program Committee of CSACS

2011 Winners

Will Skene U. de M. Developing a rapid point-of-care self-test for foetal fibronectin detection – A simple home test alerting to pre-term delivery.

Theo van de Ven McGill Paper-based sensor to detect pathogens using a displacement assay involving self-assembled block copolymer micelles.

Annual Report (2010-2011) con't.

l. Translation

On March 2010, Franck Bélanger, of Traduction CORLEO Translation, became the official translator of CSACS monthly bulletins.

m. CSACS industrial outreach day (New)

Outreach to Industry and Knowledge. This new event organized by student committee has principal aims: to provide first-hand opportunities for CSACS students and postdocs to interact with industry researchers, benefit from the latest research in the field and bring our members even closer to the needs of the industrial community.

Speakers: (July 8, 2010)

Mixime Ranger: KABS Laboratories - pharmaceutical services

François Ravenelle: Thera technologies - biopharmaceutical company

David Lessard: Labopharm - pharmaceutical

n. New staff

Roumen Christov, Research Associate

Mass Spectroscopy, McGill University, Chemistry Dept.

Mohini Ramkaran Research Associate

Atomic Force Microscopy (AFM), McGill University, Chemistry Dept.

Andrey Moiseev Postdoctoral fellow

Electron Paramagnetic Resonance (EPR), McGill University, Chemistry Dept.

Annual Report (2010-2011) con't.

o. 2010 CSACS Best Paper Award (New)

The objective of the award is to recognize the contributions of CSACS members to the research areas of Self-Assembly. For our first competition, the education and colloquia committee has selected 7 exceptional scientific journals that have an impact on the theme of self-assembly.

Nominated publications:

1. Skene, (Montreal) – Macromolecules
Selective Chain-End Postpolymerization Reactions and Property Tuning of a Highly Conjugated and All-Thiophene Polyazomethine
2. **WINNER 2010** Cosa, Sleiman, (McGill) – Nature Chemistry
Loading and selective release of cargo in DNA nanotubes with longitudinal variation.
3. Kakkar, (McGill), Winnik, (Montreal) – Biomaterials
Tailoring the efficacy of nimodipine drug delivery using nanocarriers based on A2B miktoarm star polymers.
4. Zhao (Sherbrooke)– Angewandte Chemie International Edition
Block Copolymers Comprising p-Conjugated and Liquid Crystalline Subunits: Induction of Macroscopic Nanodomain Orientation.
5. Perepichka (McGill), Rosei (INRS) – PNAS
Step-by-step growth of epitaxially aligned polythiophene by surface-confined reaction.
6. Mauzeroll (UQAM)– JACS
Synthesis of Redox Active Ferrocene-Modified Phospholipids by Transphosphatidylation Reaction and Chronoamperometry Study of the Corresponding Redox Sensitive Liposome.
7. Rey (McGill)– Soft Matter
Liquid Crystal Models of Biological Materials and Processes.

Annual Report (2010-2011) con't.

Appendix 1

Governance of the Centre for Self-Assembled Chemical Structures (CSACS)

Governing Board

Martin Grant- Chair, Dean of Science, McGill or delegate (Peter Grütter, Associate Dean)

Rose Goldstein, Vice Principal, Research, McGill or delegate (Rima Rozen - Associate Vice Principal)

Joseph Hubert - Vice Rector, Research, U. Montreal or delegate (Dominique Berube Director, Research)

Theo van de Ven - Director

Antonella Badia - Associate Director

Yue Zhao – Member

Louis Cuccia - Member

Peter MacDonald - IAC representative

Andrea Greschner - student representative

Andrew Kirk- observer/MIAM Director

International Advisory Committee (IAC)

Gregory Lopinski, NRC Ottawa

Peter MacDonald, University of Toronto

Miriam Rafailovitch, SUNY at Stony Brook

Research Activities Committee (RAC)

Theo van de Ven, McGill University (Director)

Antonella Badia , University of Montreal (Associate Director)

Linda Reven, McGill University (Former Director)

Jean-François Masson, University of Montreal

Yves Dory, University of Sherbrooke

Louis Cuccia, Concordia University

Annual Report (2010-2011) con't.

Appendix 2

BY-LAWS for the Centre for Self-Assembled Chemical Structures

1.Name:

Centre for Self-Assembled Chemical Structures

2.Location:

Department of Chemistry, McGill University, Pulp & Paper Research Centre, Rm 111.

3.Board:

The overall management of the Centre for Self-Assembled Chemical Structures is the responsibility of the governing Board. The Director of the Centre and the Research Advisory Committee are responsible for the day-to-day management. In the event of an extended absence of the Director, the Associate Director will be in charge of managing the Centre.

4.Membership of Board:

The membership of the governing Board will include the Dean of Science (McGill) to which the Centre reports officially, who will act as Chair of the Board, the Vice-Principal (Research) or delegate (McGill), the Dean of the Faculty of Arts and Science (U. Montreal), the Director and several Full Members of the Centre, one postdoctoral or graduate student and, at least, one person from outside the University, not directly involved in the Centre. This Board will meet at least once annually. The terms of appointment of the Board Members, other than those of the University officials, will normally be for three years.

5.Appointment of Director:

The appointment of the Director and Associate Director of the Centre will be the responsibility of the Board. The Board has the right to open a search for a Director, if the Board deems that this is necessary. The appointments of the Director (and Associate Director) will normally be for three years, with the opportunity of renewal once only. The nominations for Director will be made to the Board by a sub-committee consisting of the Vice-Principal (Research) or delegate as Chair, two active members of the Centre and one member of the Board. The position of Director does not automatically carry teaching release with it. Any decision on teaching release is the prerogative of the head of the home unit of the Director or the Dean of the faculty implicated.

6.Annual Report:

The Director will prepare the Annual Report of the Centre, which will include all financial details of the operation, and will present this Annual Report to the Board for approval. The Annual Report will then be submitted to the Office of the Vice-Principal (Research) for further evaluation. If necessary, the Director may be required to make a presentation to the Office of the Vice-Principal (Research) on the details of the Annual Report and the operation of the Centre.

Annual Report (2010-2011) con't.

Appendix 2 con't.

7. Membership in the Centre for Self-Assembled Chemical Structures:

There will be five classes of membership in the Centre:

Full Member

Associate Member

Visiting Member

Postdoctoral Member

Student (Graduate or Undergraduate) Member.

The ratification of nominations (which must include full curricula vitae and letters of support) for new Full and Associate Members of the Centre is the prerogative of the Board.

8. Research Funding Allocations:

Recommendations for research funding for any Members of the research centre will be made by the Director to the Board. Allocations will be based on recommendations from the Research Advisory Committee of the Centre. The composition of the Research Advisory Committee is the responsibility of the Board. Any appeals against the recommendations of the Director and the Research Advisory Committee will be heard by the Board and its decision will be final.

9. Annual General Meeting:

There will be a General Meeting of all Members of the Centre for Self-Assembled Chemical Structures once a year to discuss the Annual Report. However, only Full Members will be permitted to vote on motions presented.

10. Extraordinary Meeting of Board:

An Extraordinary Meeting of the Board can be convened if the Chair of the Board has been informed, in writing, of such a request and the letter has been signed by at least 2/3 of the Full Members of the research centre.

11. Research Agreements, Contracts and Grants:

The Centre does not have the right to enter into grant or contract agreements without the signatures of the appropriate University signing officer.

12. Dissolution of the Research Centre:

If the Centre no longer satisfies the basic requirements laid down by the University, e.g., insufficient membership, lack of demonstrable research activity, failure to file Annual Reports, or no longer a priority in the strategic plan of the university, the Vice-Principal (Research) can recommend to the Provost and Vice-Principal (Academic) that the Centre be closed.

Traduction

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Translation

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