



H<sub>2</sub>Can



**2011 H2CAN AGM & Conference**  
**Whistler, BC**  
**Fairmont Chateau Whistler**  
**May 18-20, 2011**

**H2CAN Progress and**  
**Outlook for the Future**

*Richard Chahine and Andrei V. Tchouvelev*



# Network Objectives

- ❑ To improve and develop clean and renewable methods:
  - ✓ To produce and purify hydrogen at lower cost from waste and renewable resources
  - ✓ To improve the energy density of hydrogen applications in the short and medium term (for portable and stationary applications) and in the longer term (for transportation), and
  - ✓ To optimize hydrogen energy infrastructures and systems
- ❑ To provide a common platform to foster the multidisciplinary collaborations
- ❑ To pool resources to optimize R&D costs
- ❑ To train highly qualified personnel
- ❑ To promote technology transfer to Canadian Industry, and
- ❑ To provide a forum to exchange ideas.



# Multidisciplinary Collaborations

## ❑ Exchange Program:

- ✓ Prof. Jacques Huot (UQTR) and Prof. David Mitlin (U of Alberta): Mohsen Danaie, PhD Student
- ✓ Prof. Robert A. Varin (Waterloo) and Prof. Sean McGrady (UNB): Minchul Jang, PhD Student
- ✓ Prof. Luc Bauwens (U of Calgary) and Prof. Matei Radulescu (U of Ottawa): Nika Rezaeyan, MSc Student
- ✓ Prof. David Levin (U of Manitoba) and Prof. Jacques Goyette (UQTR): Dr. Jamie Park, Postdoc
- ✓ Prof. Pierre Benard (UQTR) and Profs. Ned Djilali and Peter Oshkai (Uvic): Arash Ash, Krishna Ravi, MSc Students

## ❑ Internships:

- ✓ Prof. David Levin (U of Manitoba) and Prof. Brant Peppley (Queens): Adam Bloom (3<sup>rd</sup> Year Queen' s)



# Optimized R&D Costs

## Theme B Roster of Capabilities On Metal Hydrides

Field	Researcher	Current	Capabilities	HQP Available
Modelling	McGrady/UNB	Modelling	QQC Modelling	New MSc (100%)/existing PhD (100%)
Modelling	Medraj/Concordia	Modelling, databases	Thermo modelling + PCT/DSC etc.	1 MSc finishing, 1 PhD
Synthesis	Huot/UQTR	BCC alloy	Cold rolling	1MSc
Synthesis	Varin/Waterloo	Li/Mg complex hydrides	Synthesis + characterization	1PhD – 100% network
Synthesis and character.	Wilkinson /UBC	Complex hydride systems with LiBH4 + Mg-alloy hydrides	Synthesis + characterization	No H2CAN funding
Synthesis	Wronski/NRCan	Nano-Ni catalyst powders and foams and Li alanate	Characterization + synthesis (H2 ball mill)	50% PDF / co-op
Character.	Mitlin/UA	Cold rolling	Characterization and thin films	2 PhD (100%)
Character.	Moudrakovski/NRC	Ammonia borohydride	Solid state NMR + XRD + Raman	Parts of people up to 25%
Character.	Fritzsche/Chalk River		Neutron diffraction	
Character.	Botton/McMaster			PDF
System	Goyette/UQTR	System analysis	FE analysis	1 MSc starting (100%)



# Training of HQPs

## Plan as per Grant Application

HQP Themes A-C (cumulative)	Year 1	Year 2	Year 3	Year 4	Year 5
M.Sc. Students	25	25	1	1	1
Ph. D. Students	2	2	26	26	26
Post-doctoral fellows	5	5	5	6	6
Undergraduate students	3	3	3	3	3
Research associates	2	2	2	2	2
Total nb	37	37	37	38	38

## Actual

HQP Status	Year 1	Year 2
Undergraduate	9	15
M.Sc.	23	27
Ph.D.	16	19
PDF	7	7
RA	9	8
<b>Total</b>	<b>64</b>	<b>76</b>

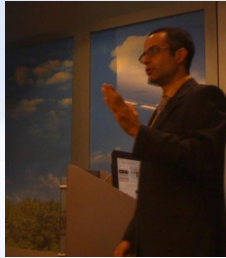
Amount of NSERC Network Funding	# of HQP
0 %	22
Partial	15
100 %	39
	<b>Total = 76</b>



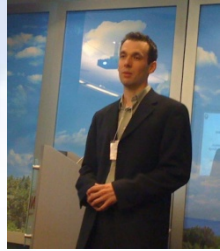
# Training of HQPs



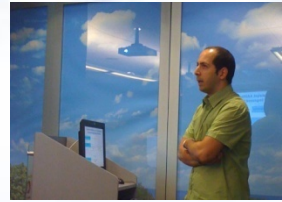
Arman Bonakdarpour



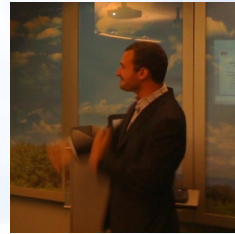
Mohsen Danaie



Christopher Harrower



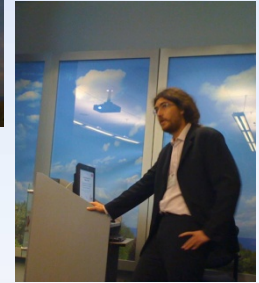
Babak Shalchi



Jean-Philippe Jacques



Maha Bourri



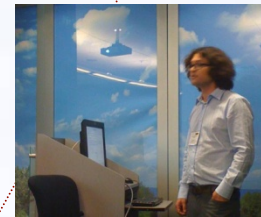
Loïc Boulon



IRH  
UNIVERSITÉ DU QUÉBEC À TROIS-RIVIÈRES  
UQTR



Julien Lang



Ege Dunder



Josue Melguizo-Gavilanes



Bappy Saha



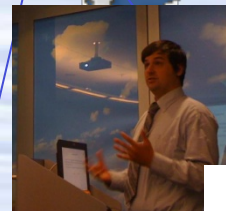
Valery B Agbor



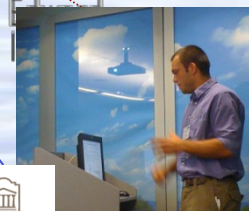
Roosebeth Parviz



Alexandru Sonoc



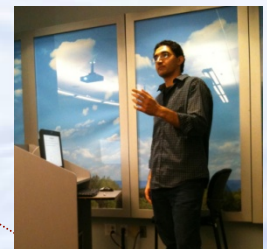
Brian Maxwell



Philip Mach



uOttawa  
L'Université d'Ottawa  
Canada's university



Reza Khaksarfard



UNIVERSITÉ  
Concordia  
UNIVERSITY



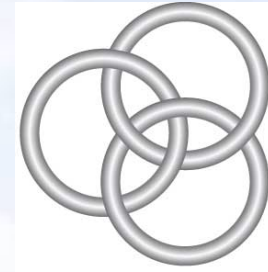
Franklin N Che



UNIVERSITY OF NEW BRUNSWICK  
FREDERICTON, SAINT JOHN ...



# Training of HQPs



**MITACS**

Positive Networking  
Workshop on May 15







# Training of HQPs

- ❑ Q: What is the meaning of “**connector**”?
- ❑ A: Not a piece of wire, but a **person connecting other people and connecting with other people**



Family of H2CAN Connectors 😊



# Value to Canadian Stakeholders

- ❑ Strong support from industry (LOIs) during the “Go / NO Go” review:
  - ✓ Air Liquide, Angstrom, AEE Quebec, DRDC, Hydro Quebec, NRCan, NRC, Lignol, Palcan, Powertech Labs, Sacre-Davy, Vale
- ❑ NSERC Strategic grant applications – 3 (1 successful)
- ❑ NSERC Engage proposal applications – 4 (3 successful, 1 in process):
  - ✓ New Network partners engaged – Ballard and Next Hydrogen
- ❑ 2010 NSERC SNEI Program application (approved additional funding by NSERC) to support competitiveness of Canadian research and industry on international arena



# Forum to Exchange Ideas





# Progress To Date Summary

- ❑ All projects went through mid-term “Go / No Go” review – final decision at the joint meeting of the Board and the Scientific Committee on May 20
- ❑ Progress Q&A:
  - ✓ Are we in line with the initial objectives – YES
  - ✓ Has the Network improved the level of Canadian research in the field of hydrogen – YES
  - ✓ Is the technical progress satisfactory – YES
  - ✓ Do we bring value to Canadian stakeholders – YES
  - ✓ Are we a learning organization – YES
  - ✓ Can we do better – YES, absolutely – continual improvement



# Outlook for the Future

- ❑ Continue to improve operations and research
- ❑ Target areas for improvement:
  - ✓ Coordination between projects within Themes
  - ✓ Collaboration across Themes
  - ✓ Stay on pace with technology development trends (example: metal hydrides)
  - ✓ Increase value to Canadian industry (Infrastructure Workshop)
  - ✓ New research activities to support SNEI program – focus on Europe (JRC) and USA (DOE programs)
  - ✓ Increase overall spending from 82% to at least 85% and research funds spending from 87% to over 90%
- ❑ Our future looks bright and promising – our work is essential in facilitating commercialization of hydrogen and fuel cell technologies – 2015 is just around the corner!



# 2011 H2CAN Conference Program

- ❑ Each Theme starts with the respective Theme leader presentation on progress and challenges
- ❑ Each Theme includes two invited industry presentations
- ❑ Each Theme ends with a Theme discussion
- ❑ Each project presentation is 15 min in length including 3 min for questions
- ❑ Invited lunch speakers for Thursday and Friday
- ❑ Poster reception on Thursday – TODAY:
  - ✓ HQPs to meet with Andrei during the first break – may start fixing their posters on poster boards
  - ✓ Enough food to be treated as dinner
- ❑ Joint Board and Scientific Committee meeting – Friday May 20
- ❑ Theme B Storage Workshop – Saturday May 21



# Contact Information

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