Curriculum Vitae

Renju Zacharia

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orcid.org: 0000-0002-8485-5676 | Researcher ID: M-3527-2015 | *h*-index: 15 | Total citations: 1484 (Google scholar) | Highest citation: 612 including 5 prestigious citations in *Nature*

Research Interests

Natural gas, hydrogen, flare-gas, carbon capture and conversion, chemical looping, catalytic partial oxidation, reformation, storage, purification, transportation application, bulk storage, adsorbent based catalysis, biogas, experiments, simulation and analytical modelling, zero-emission and low-carbon vehicular fleet, landfill gas, biomass to liquid, adsorptive spill scavenging, techno-economic feasibility, life-cycle analysis, optimization, clean energy combustion, CO_2 to value-added chemicals, efficient olefin production, olefin separation, type I/IV tank integration to FC

Education

2001-2004	**Doctor of Philosophy** (Chemistry) Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, Germany (Ph.D. awarded by Freie University Berlin) Thesis director: Prof. Gerhard Ertl (**Nobel Laureate, Chemistry 2007**). Thesis: Desorption of gases from graphitic and porous carbon surfaces
1997-1999	**Master of Science** (Chemistry) Indian Institute of Technology Madras, India Master Thesis: Synthesis and stabilization of thiol-capped gold nanoclusters CGPA: 7.36
1993-1996	**Bachelor of Science** (Chemistry) Mahatma Gandhi University, Kottayam, India Chemistry (87%), Mathematics (100%), Physics (95%)

Work Experience

August 2015– Till now **Assistant Professor**

	Gas Processing Center College of Engineering Qatar University, Qatar
June 2016 – July 2018	**Visiting Professor** Department of Physics, Chemistry and Biochemistry Université du Québec à Trois-Rivières, Québec, Canada
May 2009 – August 2015	**Senior Research Scientist** Hydrogen Research Institute Université du Québec à Trois-Rivières, Québec, Canada
November 2007 – April 2009	**Postdoctoral Researcher** Hydrogen Research Institute Université du Québec à Trois-Rivières, Québec, Canada
January 2005 – September 2007	**Research Scientist** Department of Chemical Engineering Chonbuk National University, Jeonju, South Korea
January 1999 – March 2001	**Junior Research Fellow** Department of Chemistry, Indian Institute of Technology Mumbai, Mumbai, India

Grants

Number of grant submission: 10, Active: 5, Under evaluation: 3

No	Title and status of project	Organization	Role	Amount
1	Novel solid-state hydrogen storage solutions for light-duty vehicles, SRNL Clean Energy Project **(Completed).**	USDOE, 2015	Research Coordinator	100,000 USD (6 months)
2	Composite sorbents for reversible storage of ammonia (**Completed**).	Qatar University, 2016	Lead PI	9792 QAR (8 months)
3	MoVTeNbOx family of quaternary multimetal mixed oxide nanocatalysts dispersed on mesoporous cerium oxide support for oxidative dehydrogenation of ethane **(Active)**.	Qatar University, 2016	Lead PI	120,000 QAR (18 months)
4	Thermodynamic and kinetic investigation of the adsorptive removal of Non-Acid Hydrocarbons from process water **(Active).**	Qatar University, 2016	Lead PI	9,893 QAR (12 months)

5	Improving industrial biogas and hydrogen purification in PSA processes, Collaborative R&D **(Active).**	NSERC, 2015	Research Manager	261,000 CAD (3 years)
6	Microbial electro-catalytic conversion of CO_2 to linear alpha olefins **(Submitted)**.	NPRP/QNRF, 2017	Lead PI	600000 USD (Secured 8000 USD from QAPCO in-kind) (3 year)
7	Development and Evaluation of Nano-particle-based Biocatalysts for the treatment of GTL Process Water **(Submitted)**.	NPRP/QNRF, 2017	PI	600000 USD (Secured 40000 USD from Shell in-kind) (3 year)
8	Development of polymeric network materials for CO_2 conversion to Value Added Chemicals: Combined theoretical and Experimental study **(Submitted)**.	Qatar University, 2017	Lead PI	10000 QAR (6 months)
9	Carbon Nanotube Reinforced Cementitious Mortar for enhanced strength applications (**To be Submitted**).		PI	

Journal Editorial Board

International Journal of Hydrogen Energy, Elsevier Inc.
Assistant Subject Editor

Journal of Nanomaterials
Special issue on Nanomaterials for Renewable Energy Storage: Synthesis, Characterization, and Applications (NRES), Hindawi Publication Corporation
Lead Guest Editor (2016-2017)

Natural Gas Science and Engineering
Special issue from the International Gas Processing Symposium 2016
Guest Editor (2016-2017)

Journal of Nanomaterials
Special issue on Nanomaterials for Renewable Energy Storage: Synthesis, Characterization, and Applications (NRES), Hindawi Publication Corporation
Guest Editor (2015-2016)

Codes and Standards

- Contributed to the subcommittee for **Canadian Hydrogen Installation Code** in the context of applications to small commercial systems and laboratories, 2015.

Books and Manuals

1) Adsorptive removal of non-acid oxygenates from GTL water, **R. Zacharia**, M. El-Naas, M. J. Al-Marri, Eds. Book Chapter, CRC, 2017 (Submitted).
2) Soft-templated mesoporous carbons: Chemistry and Characteristics, D. Saha, **R. Zacharia**, A. Naskar, ACS Symposium Book chapter: Polymer Derived Carbon, Ed. A. M. Naskar and W. P. Hoffman (2014, http://pubs.acs.org/doi/pdf/10.1021/bk-2014-1173.ch004).
3) Quick - Operation Manual for Omega 8200 Series Temperature Controller, **Renju Zacharia**, University of Quebec Trois-Rivieres, November 2008.

Scientific Publications

1) Metal-Organic Framework UiO-66 for Hydrogen Purification in Sorption-Enhanced Steam Methane Reformation: Parametric effects, Mohamed Khairy Youssef, **Renju Zacharia**, Mohammed J. Al-Marri, and Majeda Khraisheh (Submitted, 2017)
2) Bioelectrochemical systems as a tool to capture CO_2 in a more sustainable way with simultaneous transformation into value-added products, Sandipam Srikanth, Suman Bajracharya, Gunda Mohanakrishna, **Renju Zacharia**, Deepak Pant, (J Power Sources, 2017).
3) How the activation process modifies the hydrogen storage behavior of biomass-derived activated carbons, Najoua Bader, **Renju Zacharia**, Ouederni Abdelmottaleb, Daniel Cossement, (J Porous Materials, 2017, doi:10.1007/s10934-017-0436-8).
4) Thermodynamics and kinetics of CH_4/CO_2 binary mixture separation by IRMOF-1 from $CD_4/^{13}CO_2$ isotope exchange and adsorption breakthrough, Luis Fernando Gomez, **Renju Zacharia**, Daniel Cossement, Richard Chahine, Pierre Benard, (Submitted, 2016).
5) Separation of CO_2/CH_4 gas mixtures on MIL-53, Luis Fernando Gomez, **Renju Zacharia**, Pierre Benard, Richard Chahine (Journal of Nanomaterials, http://dx.doi.org/10.1155/2015/4393822015).
6) Outlook and Challenges for hydrogen storage in nanoporous materials, Darren Broom, Michael Hirscher, Bart van Hassel, Donald Anton, **Renju Zacharia**, Richard Chahine, Jim Webb, Katherine Hurst, Tom Gennett, Philip Parilla, Theodore Steriotis, George Froudakis, Pantelis N. Trikalitis, Channing Ahn, Brown Craig, App. Phys. A, 2016, http://link.springer.com/article/10.1007/s00339-016-9651-4.
7) Investigation of the adsorbed density of hydrogen in MOF-5 using Path Integral Grand Canonical Monte Carlo adsorption isotherm at supercritical and subcritical temperature, David Durette, Pierre Benard, **Renju Zacharia**, Richard Chahine, Science Bulletin, 2016, http://link.springer.com/article/10.1007%2Fs11434-016-1027-9 (Published with the cover page).
8) Charge-discharge cycling, flowthrough cooling and para-ortho conversion for cooling bulk hydrogen storage tank filled with MOF-5, S. Ubaid, **R. Zacharia**, J. -S. Xiao, R. Chahine, P. Bénard, P. Tessier, Int. J. Hydrogen Energy, 2015, DOI:10.1016/j.ijhydene.2015.10.056.

9) Isosteric heat of hydrogen adsorption on MOFs- Comparison between adsorption calorimetry sorption isosteric method and analytical models, K. A. Follivi, **R. Zacharia**, M. Hirscher, D. Cossement, R. Chahine (*Invited Contribution*, App. Phys. A, 2015, DOI: 10.1007/s00339-015-9484-6).
10) Review of solid state hydrogen storage methods adopting different kinds of novel materials, **Renju Zacharia**, Sami U. Rather, Accepted in the special issue of Nanomaterials for Renewable Energy Storage: Synthesis, Characterization, and Applications" (Journal of Nanomaterials, 201, http://www.hindawi.com/journals/jnm/aip/914845/).
11) Multicomponent adsorption of biogas compositions containing CO2, CH4 and N2 on Maxsorb and Cu-BTC using Extended Langmuir and Doong Yang Models, Luis Fernando Gomez, **Renju Zacharia**, Pierre Benard, Richard Chahine (Adsorption, 2015: DOI: 10.1007/s10450-015-9684-6).
12) Effect of flowthrough cooling on the performance of MOF-5 cryo-adsorptive hydrogen reservoir for stationary applications; S. Ubaid, **R. Zacharia**, J.-S. Xiao, R. Chahine, P. Bénard, P. Tessier (Int. J. Hydrogen Energy, 2015: DOI :10.1016/j.ijhydene.2015.05.097).
13) SRNL Technical Work Scope for the hydrogen storage engineering center of excellence, Donald Anton, Theodore Motyka, Richard Chahine, David Tamburello, Claudio Corgnale, Francis Lafontaine, Martin Sulic, Mathew Kesterson, **Renju Zacharia**, Proceedings of Annual Merit Review Meeting, Hydrogen and Fuel Cell Program, US DOE, Washington D.C.
14) Specific heat capacities of MOF-5, Cu-BTC, Fe-BTC, MOF-177 and MIL-53 over wide temperature ranges: measurements and application of empirical group contribution method; K. A. Follivi, **R. Zacharia**, D. Cossement and R. Chahine (Micro. Meso. Mater., 2015: DOI:10.1016/j.micromeso.2015.05.047).
15) Potential theory for prediction of high-pressure gas mixture adsorption on activated carbon and MOFs; E. Dundar, **R. Zacharia**, R. Chahine and P. Bénard (Sep. Purif. Technol., 2014; DOI: 10.1016/j.seppur.2014.08.021).
16) Effect of *ortho-para* conversion on the hydrogen storage system performance; S. Ubaid, J.-S. Xiao, **R. Zacharia**, R. Chahine and P. Bénard, (Int. J. Hydrogen Energy, 2014; DOI: 10.1016/j.ijhydene.2014.05.101).
17) Performance comparison of three analytical models for supercritical adsorption of hydrogen on MOFs; E. Dundar, **R. Zacharia,** P. Bénard, R. Chahine (Fluid Phase Equilib., 2014; DOI: 10.1016/j.fluid.2013.11.029).
18) Development of a scalable and versatile multi-component real gas mixing system, **R. Zacharia**, B. Lefebvre, D. Cossement, R. Chahine (Sep. Purif. Technol., 2013; DOI: 10.1016/j.seppur.2013.08.012). *Identified as a Key Scientific Article contributing to excellence in engineering, scientific and industrial research by Advances in Engineering*.
19) Application of multi-potential theory for adsorption isotherms over a wide range of temperature, E. Dundar, **R. Zacharia**, P. Bénard, R. Chahine (Int. J. Hydrogen Energy, 2011; DOI: 10.1016/j.ijhydene.2012.03.021).
20) Synthesis, characterization and hydrogen adsorption on mesoporous metal-organic frameworks Al, Cr, Fe and Ga BTB, D. Saha, **R. Zacharia**, L. Lafi, D. Cossement, R. Chahine (Chem. Eng. Journal, 2011; DOI: 10.1016/j.cej.2011.04.019).
21) Hydrogen adsorption properties of metal organic framework Al-TCBPB, D. Saha, **R. Zacharia**, L. Lafi, D. Cossement, R. Chahine (Int. J. Hydrogen Energy, 2011; DOI: 10.1016/j.ijhydene.2011.12.072).

22) Volumetric hydrogen storage capacity of monoliths prepared by mechanical densification of MOF-177, **R. Zacharia**, D. Cossement, L. Lafi, R. Chahine (J. Mater. Chem., 2010; DOI: 10.1039/B922991D).
23) Hydrogen adsorption in nanostructured TiO_2 impregnated carbon nanotubes, S. Rather, **R. Zacharia**, S. W. Hwang, M. Naik, K, S. Nahm, A. R. Kim (Int. J. Hydrogen Energy, 2008; DOI doi:10.1016/j.ijhydene.2008.09.089).
24) Surface adsorption and micropore filling of hydrogen in activated MWCNTs, S. Rather, **R. Zacharia**, S. W. Hwang, M. Naik, K. S. Nahm, A. R. Kim (Int. J. Hydrogen Energy, 2008; DOI doi:10.1016/j.ijhydene.2008.08.040).
25) Comparative study of the dehydrogenation of sodium aluminum hydride wet-doped with $ScCl_3$, $TiCl_3$, and VCl_3; M. Naik, **R. Zacharia**, S. Rather, S. W. Hwang, C. S. Soo, A. R. Kim, K. S. Nahm (J. Alloys Comp., 2008; DOI: doi:10.1016/j.jallcom.2008.03.093).
26) Spillover of physisorbed hydrogen from sputter-deposited array of platinum nanoparticles to multi-walled carbon nanotubes, **R. Zacharia**, S. Rather, S. W. Hwang, K. S. Nahm (Chem. Phys. Lett., 2007; DOI: doi:10.1016/j.cplett.2006.12.022).
27) Intrinsic linear scaling of the hydrogen storage capacity of carbon nanotubes with their specific surface area, **R. Zacharia**, K. Y. Kim, S. W. Hwang, K. S. Nahm (Catal. Today, 2007; DOI: doi:10.1016/j.cattod.2006.09.026).
28) Perspectives on an advanced hydrogen storage system: Platinum-carbon nanotube nanocomposite materials, **Renju Zacharia**, Sami-ullah Rather, Sang Woon Hwang, Arul Manuel Stephan, Kee Suk Nahm, in *Mobile Energy*, edited by A. Nathan *et. al.* (Mater. Res. Soc. Symp. Proc., 2007).
29) Hydrogen uptake of palladium embedded MWCNTs produced by incipient wetness impregnation and condensed phase reduction method, S. Rather, **R. Zacharia**, S. W. Hwang, M. Naik, K. S. Nahm (Chem. Phys. Lett. 2007; DOI: doi:10.1016/j.cplett.2007.05.006).
30) Hyperstoichiometric hydrogen storage in monodispersed palladium nanoparticles, S. Rather, **R. Zacharia**, S. W. Hwang, M. Naik, K. S. Nahm (Chem. Phys. Lett., 2007).
31) Interaction of gases and solvents with graphite and carbon nanotubes from thermal desorption spectroscopy, H. Ulbricht, **R. Zacharia**, N. Cinder, T. Hertel, (Carbon, 2006; DOI: doi:10.1016/j.carbon.2006.05.040).
32) Enhancement of the hydrogen storage capacity of carbon nanotubes via spill over from palladium and vanadium nanoclusters, **R. Zacharia**, K. Y. Kim, A. K. M. F. Kibria, K. S. Nahm, (Chem. Phys. Lett., 2005; DOI: doi:10.1016/j.cplett.2005.07.020).
33) Advances in the technologies of solid state hydrogen storage using novel nanoporous materials, **R. Zacharia**, K. Y. Kim, K. S. Nahm, (Kor. Chem. Eng. Research, 2005).
34) Application of carbon nanomaterials as microwave absorption materials, M. Sharon, D. Pradhan, **R. Zacharia**, V. Puri (J. Nanosci. Nanotechnol., 2005).
35) Application of Taguchi analytical method for optimization of experimental parameters for the synthesis of carbon nanotubes and nanobeads, M. Sharon, **R. Zacharia**, P. R. Apte, S. C. Purandare (J. Nanosci. Nanotechnol., 2005).
36) Interlayer cohesive energy of graphite from thermal desorption of polyaromatic hydrocarbons, **R. Zacharia**, H. Ulbricht, T. Hertel (Phys. Rev. B, 2004).
37) Synthesis and characterization of thiol-protected gold nanoclusters, R. Zacharia, P. Talappil (Proceedings of Indian Spectrophysics Association, 1999).

Prizes and Honors

- Hydro-Quebec Excellence Fellowship, 2007, Canada
- Korean Research Foundation Fellowship, South Korea, 2007
- Ministry of Science and Technology Research Fellowship, South Korea, 2004
- Brain Korea 21 Fellowship, South Korea
- Max-Planck-Society Fellowship, Germany 2001
- Department of Science and Technology Fellowship, India, 1999
- Council of Scientific and Industrial Research Fellowship (with NET), Government of India, 1999.
- Award for best outgoing student in B.Sc. Chemistry. 1996.
- Invited to Marks Who's Who in the World for distinguished scholars, 2007
- Invited to 2015-16 Times Higher Education World University Ranking, 2015
- ScienceDirect Ranks 3rd most downloaded articles in Chemical Physics Letters, July 2005
- Top 1 % research chemist based Graduate Aptitude Test in Engineering Studies, India, 1999 (score of 98.8 percentile).

Reports

1) Development of experimental tools for studying multicomponent gas adsorption and generating core properties for engineering process design, Final report to Natural Science and Engineering Research Canada, 2016.
2) Development of experimental tools for studying multicomponent gas adsorption and generating core properties for engineering process design, project report to Natural Science and Engineering Research Canada, 2013.
3) Development of experimental tools for studying multicomponent gas adsorption and generating core properties for engineering process design, project report submitted to Natural Science and Engineering Research Canada, 2012.
4) Hybrid Nanoporous Materials for Hydrogen Storage and Other Applications Progress Report submitted to Natural Resources Canada, 2012.
5) Project Annual Status Report submitted to the Office of Energy Research and Development Natural Resources Canada, 2012.
6) Hybrid Nanoporous Materials for Hydrogen Storage and Other Applications Progress Report submitted to Natural Resources Canada, 2011.
7) Project Annual Status Report submitted to the Office of Energy Research and Development Natural Resources Canada, 2011.
8) Synthesis, Simulations, Hydrogen Storage and System modeling using hybrid materials for gas storage and transportation applications, mid-term report submitted to Natural Resources Canada, 2010.
9) Hybrid Nanoporous Materials for Hydrogen Storage and Other Applications Progress Report submitted to Natural Resources Canada, 2010
10) Hydrogen storage in modified nanoporous materials, Final Report presented to Natural Resources Canada, 2008
11) Hydrogen storage in modified nanoporous materials, Progress Report presented to Natural Resources Canada, 2007.

Conferences, Workshops, Invited Talks and Webinars

1) Metal-Organic Framework UiO-66 hydrogen purification from sorption-enhanced steam methane reformation streams, Annual Research Forum, Qatar University (Doha, 2017).
2) Benchmarking MOF-5 for biogas sweetening: Experiments and Simulations, *The 5th International Gas Processing Symposium* (Doha, 2016).
3) Nanoporous adsorbents for gas processing applications: Knowledge gap between synthesis and applications, *The 5th International Gas Processing Symposium* (Doha, 2016).
4) Hands on training in Endnote*, Workshop at Gas Processing Center for Ph.D. Students*, Qatar University (2016).
5) Participant of the Qatar-France Academia-Industry Collaboration Initiative, Qatar National Research Fund, Doha (2016).
6) Attendee of the EU-GCC Workshop Opportunities and Challenges in Sustainable Energy Research, Qatar National Research Fund, Doha (2016).
7) Catalytic processes for clean energy applications, Technical Committee Meeting, Gas Processing Center, Qatar University, Doha (2016).
8) Isotope Exchange Technique for Simultaneous measurement of multicomponent adsorption isotherms and kinetics on porous sorbents, Webinar presented to Air Liquide and Hydrogen Research Institute (2015).
9) Attendee of Niche markets for Electric, Hybrid and Hydrogen Vehicles, VPP Workshop, IEEE, University of Quebec Trois-Rivieres (2015).
10) Partner attendee to the Hydrogen and Fuel Cell, Annual Merit and Peer Review Meeting, U.S Department of Energy at Washington DC, USA (2014).
11) *Invited* attendee to the Hydrogen Implementation Agreement Task-22 meeting, International Energy Agency (IEA) at Quebec, Canada (2007).
12) Hydrogen Storage in Porogen Treated MWCNTs, Korea Hydrogen and Renewable Energy Symposium, Seoul, Korea (2007).
13) Hydrogen Physisorption and spillover from array of Pt nanoparticles sputter deposited on MWCNTs, Fall meeting, Korean Institute of Chemical Engineers, Seoul (2006).
14) Perspectives on the mobile energy storage systems using hydrogen adsorption in novel nano-composite materials, *Invited presentation*, Fall meeting, Materials Research Society, Boston, USA (2006).
15) Development of solid-state hydrogen storage system using carbon nanotubes, Hydrogen and Fuel cell workshop, Korea (2006).
16) State of the art solid-state hydrogen storage systems using nanostructured materials, *Invited presentation*, Spring meeting, Korean Electrochemical Society, Korea (2006).
17) Intrinsic linear scaling of the hydrogen storage capacity of carbon nanotubes with their specific surface area, Korea Conference on Innovative Science and Technology, Korea (2005).
18) Enhancement of the electrochemical hydrogen storage of hydrogen in alkali-doped carbon nanotubes, Poster presentation, 56th ISE meeting, International Society of Electrochemistry, Busan Korea (2005).
19) High-density solid-state hydrogen storage using novel nanoporous materials – an overview, Invited presentation, 3rd Symposium of nanochemical processing, Korea (2005).
20) Oxidative dehydrogenation of ethylbenzene on carbon nanotubes: Thermal desorption study, Invited presentation, 3rd Carbon day, Fritz Haber Institute der Max Planck Gesellschaft, Germany (2004).

21) Determination of the cohesive energy of graphite from TDS of polyaromatic hydrocarbons adsorbed on HOPG, Spring meeting, German Physical Society, Germany (2003).
22) Synthesis and stability of gold nanoclusters, 2nd national conference of Indian Spectrophysics Association, India (1999).

Training/Workshop given to faculty and staff

1) Safe handling of compressed gases, on "Safety Day Workshop", Gas Processing Center, Qatar University (2016).
2) How to quickly setup your faculty website using WordPress, *Facilitating Workshop for GPC faculty*, Gas Processing Center, Qatar University (2016).

Courses

- Applied Research Methodology DENG 602, College of Engineering, Qatar University, Fall 2016 for Ph.D. Students.
- Graduate Seminar, GENG 606, College of Engineering, Qatar University, fall 2015 For Master Students.
- Graduate Seminar, GENG 606, College of Engineering, Qatar University, fall 2016 for Master Students.
- Laboratory Automation (for Physical Chemistry Experiments), University of Québec Trois-Rivieres, 2015. (Voluntary course for graduate students).
- Courses requested for 2017 Spring: Clean Energy Resources (EEMP 526), Physicochemical Processes in Environmental systems (EEMP 509), Environmental Chemistry (EEMP 504) and Atmospheric pollution and air quality management (EEMP 529).
- Experienced in using Blackboard system, Online teaching course, Qwickly Attendance.

Evaluation of thesis

1) Ph.D. Thesis, N. Ravi, Bharathidasan University, India, **Laser Surface Alloying of Aluminium Alloy Al-12Si and Steel with Preplaced Metal Powder Coatings** (Nominated).
2) Ph.D. Thesis, Luis Fernando Gomez, IRH, Université du Québec à Trois-Rivières, Thesis title: **Etude des processus d'adsorption de melanges gazeux sur des adsorbants fortement microporeux dans le context de la production de biomethane** (2016).
3) Ph.D. Thesis: Siyad Ubaid, IRH, Université du Québec à Trois-Rivières, Thesis title: **Simulations for Investigating the multiphysics performance of a cryo adsorptive hydrogen storage reservoir filled with MOF-5 for bulk storage and distribution applications** (2015).
4) Ph.D. Thesis: Ege Dundar IRH, Université du Québec à Trois-Rivières, Thesis title: **Modelling potential theory of adsorption process in microporous materials** (2014).
5) Ph.D. Thesis: M. Raju, Indian Institute of Technology Chennai, Thesis title: **Electrochemical characterization of misch metal based AB5-type alloys** (2012).
6) Master Thesis: K. A. Follivi, Université du Québec à Trois-Rivières, Thesis title: **Characterization of adsorbent materials for hydrogen storage** (2014).

Chair/Jury/Examiner of the Masters/PhD Thesis Defense

1) Reem Fouad Younis, *as the Chair* of Master Thesis Oral Examination, Qatar University (2017).
2) Anju Ashok, as the member of Ph.D. Candidacy Exam Committee, Qatar University (2016).
3) Siyad Ubaid, as an external examiner of the Ph.D. Thesis Defense, Université du Québec à Trois-Rivières (2015).
4) Ege Dundar, as an internal examiner of the Ph.D. Thesis, Defense, Université du Québec à Trois-Rivières (2014).
5) Ege Dundar, as the Jury committee member, for the Thesis Defense, Université du Québec à Trois-Rivières, Ph.D (2014).

Evaluation of Proposals

1) New Generation of Electrocatalyst and Membranes for Direct Methanol Fuel Cell Applications, Internal Grant Proposal submitted to Center of Advanced Materials, Qatar University, 2015.

Editorials, Educational Blogs and Infographics

1) Nanomaterials for Renewable Energy Storage: Synthesis, Characterization, and Applications, *Editorial to Journal of Nanomaterials, 2015*.
2) Mirai of Toyota, Future of FCV, Seven less commonly known facts about Toyota Mirai, (Invited Blog contribution to LinkedIn Pulse, 2014) https://www.linkedin.com/pulse/article/20141203200942-46665482-mirai-of-toyota-future-of-fcv?trk=prof-post.

Organization of conferences, symposia and workshops

1) Organizing Committee, the 7th GASNA competition for K-12 Students, Doha, Qatar, 2017.
2) Session Chair, The 5th International Gas Processing Symposium, Doha, Qatar, 2016.
3) Organizing Committee of the Safety Day Workshop, at the Gas Processing Center, Qatar University, Doha, Qatar, 2016.
4) Organizing committee of The 5th International Gas Processing Symposium, Doha, Qatar, 2015-2016.
5) Organizing committee of International Workshop of nanotubes NT01, Germany 2001.

Supervision of Bachelor, Master Students and Research Assistants

As Lead Supervisor

1) Abdalla Babiker
   Research Assistant, Gas Processing Center

Qatar University, Doha Qatar

2) Somayeh Ali Rahimi Fard
   Bachelor of Engineering
   Chemical Engineering, Qatar University, Doha Qatar
3) Sarah Abdel Mahmoud Ali
   Bachelor of Engineering
   Chemical Engineering, Qatar University, Doha Qatar
4) Nada Mahmood Al Gunid
   Bachelor of Science
   Qatar University, Doha Qatar
5) Khawla Mozamil Mustafa
   Bachelor of Science, Department of Chemistry
   Qatar University, Doha Qatar
6) Mohamed Khairy Youssef
   Bachelor of Engineering
   Chemical Engineering, Qatar University, Doha Qatar
7) Shaima Al-Malki
   Bachelor of Engineering
   Chemical Engineering, Qatar University, Doha Qatar
8) Habiba Zamil Badshah
   Bachelor of Engineering
   Chemical Engineering, Qatar University, Doha Qatar
9) Sabrina Belloula
   Bachelor of Engineering
   Chemical Engineering, Qatar University, Doha Qatar
10) Aman Issa
    Bachelor of Engineering
    Chemical Engineering, Qatar University, Doha Qatar
11) Noor
    Bachelor of Engineering
    Environmental Engineering, Qatar University, Doha Qatar

As director of laboratory

12) A. K. Follivi
    Master of Science, Department of Chemistry, Physics and Biology
    Université du Québec à Trois-Rivières, Québec, Canada
13) Keun-Young Kim
    Master of Science, Department of Chemical Engineering, Chonbuk National University, South Korea
14) Samuel Otis (Internship)
    CEGEP (Bachelor)
    Université du Québec à Trois-Rivières, Québec, Canada
15) Benoit Lefebvre (Internship)
    Master of Science, Department of Chemistry, Physics and Biology
    Université du Québec à Trois-Rivières, Québec, Canada
16) Noël Ngandui (Internship)

Polytechnique Montreal
Université du Québec à Trois-Rivières, Québec, Canada

Supervision of Ph.D. Students

As Co-Supervisor

17) Siyad Ubaid
Ph.D. Department of Chemistry, Physics and Biology, Université du Québec à Trois-Rivières, Québec, Canada
18) Luis Osrono Fernando
Ph.D. Department of Chemistry, Physics and Biology, Université du Québec à Trois-Rivières, Québec, Canada

As director of laboratory/thesis

19) Sami-Ullah Rather
Ph.D, Department of Chemical Engineering, Chonbuk National University
South Korea
20) Ege Dundar
Ph.D. Department of Chemistry, Physics and Biology, Université du Québec à Trois-Rivières, Québec, Canada
21) Sang-Woon Hwang
Ph.D., Department of Chemical Engineering, Chonbuk National University
South Korea
22) Najoua Bader (Internship)
Ph.D. Department of Chemistry, Physics and Biology, Université du Québec à Trois-Rivières, Québec, Canada

Reviewer of Journals

1) Energy and Fuels (ACS)
2) International Journal of Hydrogen Energy (Elsevier)
3) Microporous and Mesoporous Materials (Elsevier)
4) Industrial and Chemical Engineering Research (ACS)
5) Materials Chemistry and Physics (Elsevier)
6) Journal of Alloys and Compounds (Elsevier)
7) Brazilian Journal of Chemical Engineering
8) Material Letters (Elsevier)
9) Cryogenics (Elsevier)
10) Journal of Natural Gas Science and Engineering (Elsevier)

University and Departmental Duties and Services

1) Judge for the Undergraduate Research Poster Competition: "My Gateway to Research" event (2017).

2) Coordinator of the Gas Processing Center for the Qatar University Institutional Repository (QSpace), 2017.
3) Editorial Board of GPC-Newsletter; Cover design of the News Letter, 2017.
4) Editorial Board of GPC-Newsletter; Cover design of the News Letter, 2016.
5) Member of Technical Advisory Committee for GPC-Industry consortium, Gas Processing Center, Qatar University Doha, 2017, 2016, 2015.
6) Team lead for the Developing and implementing social media and web presence of GPC, Gas Processing Center, Qatar University Doha, 2017, 2016, 2015.
7) Administration of GPC's webpage, LinkedIn, facebook and twitter accounts. Designed and administered the webpage for the 5th International Gas Processing Symposium, 2017, 2016, 2015.
8) Secretary of the Health and Safety Committee of the Gas Processing Center, Qatar University, Doha, 2017, 2016, 2015
9) Committee member for the Strategic Planning Committee of Gas Processing Center, Qatar University, Doha, 2015.
10) Coordinator for the emergency evacuation plan at the Institute for Research on hydrogen, UQTR, Trois-Rivières, 2013-2015.
11) Student advisor for freshman Master Chemistry students, Indian Institute of Technology, 2000.

Faculty improvement Seminar and Workshop Participation

1) Workshop: Skeleton Lecture Notes, Workshop, Organized by OFID, 26 April 2017.
2) Joint Symposium on Research Activities in Qatar, Texas A & M, Qatar, 18 April 2017.
3) How to write great papers and get published, Workshop Seminar Organized by OFID, QU 22 March 2017.
4) How to Improve Your Courses Using Self-Assessment Techniques, Seminar Organized by OFID, QU, 20 March 2017.
5) Qwickly Attendance Tools, Workshop organized by OFID QU, 28 February 2017.
6) Inquiry-based Teaching Strategies to promote Critical Thinking, Seminar organized by OFID QU, 28 February 2017.
7) Scopus Database and Mendeley Software, Seminar organized by OFID QU, 09 November 2016.
8) Web of Science, Incite and EndNote, Workshop organized by OFID QU, 18 October 2016.
9) Overview of Trends and Cases of Online Courses Implementation in Qatar University, Seminar organized by OFID QU, 04 October 2016.
10) Discussion Boards, Journals, Workshop organized by OFID QU, 05 October 2016.
11) Blackboard Grade Center, Workshop organized by OFID QU, 25 September 2016.
12) Developing Institutional Leadership: Strategic Approaches to the Scholarship of Educational Leadership Within and Across the Disciplines in Diverse University Contexts, Seminar organized by OFID QU, 21 September 2016.
13) Blackboard 9.1 Content: Uploading and Organizing files, Creating Folders, Links, Mashups and Assignments, Workshop organized by OFID QU, 19 September 2016.
14) Hands-on training on the Online Assessment Management System, Workshop organized by OFID QU, 25 May 2016.
15) Using Technology to enhance Active Learning, Seminar organized by OFID QU, 24 May 2016.
16) Seminar on Anti-Plagiarism tools, OFID, QU.

Certifications

- Time Management Fundamentals, Lynda.com (December 2016)
- Six Sigma Fundamentals, Lynda.com (December 2016).

Collaborations

Department of Energy, United States, (Savannah River National Laboratory HSECoE) (2010-2015).

- Evaluated the system level performance of a subscale prototype adsorbent hydrogen storage tank for light-duty fuel cell automobiles. Performed UDDS/HWFET/US06 Drive Cycle tests with the subscale prototype**.**
- Coordinated the development of a flowthrough cooling test bench to study the thermal and storage performances of subscale prototype adsorptive storage system.
- Designed a control and acquisition system that allows remote control and filling hydrogen at a rate of 1000 SL per minute into adsorptive test tank.
- Contributed to the "Best practices for hydrogen storage measurements and characterization of materials for storage".
- Developed a charging system for the high volumetric density of hydrogen storage and its optimization.
- Guided assembly of two commercial compressed hydrogen tanks Dynetek 35 MPa on a commercial trailer to transport hydrogen from a refueling station at a test facility hydrogen storage system (complies with Transport Canada regulations and the Ministry of Transportation of Quebec security).

Air Liquide, BASF (2010-2015)

- Designed and implemented a real gas mixing system capable of producing gas mixtures with a precision to the final concentration of 0.8%.
- Designed and implemented an isotope exchange adsorption system, — a sophisticated test-rig that enables simultaneous probing of multicomponent gas adsorption equilibrium, kinetics, selectivity and isosteric heats on porous sorbents.

Toyota Motors (2007-2008)

- Developed a Sievert's volumetric hydrogen storage equipment for measuring the performance of the hydrogen storage nanomaterials, activated carbon and metal-organic networks.
- Developed a load cell system for compacting high surface area porous materials for high volumetric density hydrogen storage and optimization of compaction for the optimum material based storage systems.

Xebec (2014-2015)

- Performed parametric study of multigas adsorption isotherms on microporous materials using different analytical models.

- Developed a breakthrough test bed for studying gas transport dynamics of multicomponent mixtures on MOFs.

Research competence

- Nanomaterial (metals, bi-metallic alloys and metal oxides) synthesis using reduction precipitation method, wet impregnation, sputtering, sol-gel, combustion synthesis and chemical vapor deposition. Embedding metal nanoparticles in CNTs.
- Spectroscopy and microscopy: (Raman, IR, XRD, UV-Visible, MS, XPS, SEM, TEM, TPD, TPO.)
- Data acquisition and communication: Real time and non-deterministic data acquisition and control via OPC, Serial (RS232, USB), Field-Point, cDAQ, TCP/IP, Modbus, GPIB.
- Security related knowledge of component selection and installation in Class 1 Division 2 Hazardous Locations.
- Software: LabVIEW (+DSC and PID toolkits), Origin, Solidworks, MATLAB, NIST REFPROP, VISIO, Igor Pro, ANOVA, COMSOL Multiphysics, CORELDRAW and EndNote.
- Quantum Mechanical Calculations (DFT, Spartan 16)
- Adsorption Process Modeling (ASPEN Adsim) and multicomponent isotherm modeling using numerical and analytical methods (IAST)
- Multiparameter synthesis optimization.
- Analytical/numerical modeling of isotherms (MPTA, Dubinin-Astakhov, Unilan, Toth, IAST)
- Construction of test benches of pressure swing adsorption, adsorption breakthrough, hydrogen storage, and measurement of real gas mixtures adsorption thermodynamics.
- Pilot-scale systems: Basic experience with pressure swing adsorption (PSA) pilot plant. Worked with commercial hydrogen tank (35 MPa, Dynetek) for vehicular hydrogen storage, 35 MPa-rated solenoid valves (Dynetek), Class 1 Division 2 electric components for safe discharging of hydrogen from high-pressure tanks, pressure relief devices, emergency shut-off relays. Built a scale-up test-bench to fuel hydrogen into a 2L type-I hydrogen tank at flow rate of 1000 standard liter Hydrogen/minute.
- Lead the assembly of two commercial hydrogen tanks (Dynetek Type 3 tank 35 MPa) and BOP components on a commercial trailer for transporting hydrogen from a hydrogen refueling station to a test site. The assembly had all components for safe charging and discharging hydrogen; these include, high pressure monitor, regulator relief valve, solenoid shut-off valve, fueling nozzle. Developed an automatic shut-off circuit for unforeseen power-failure while filling. Developed a test system to fast fill cryogenic high pressure hydrogen into a subscale prototype Type-1 (Hexagon Lincoln Tank) to hydrogen storage tank. The target fill rate of 1000 Standard Liter per Minute, 77 K and 10 MPa achieved for the Type -1 Tank.
- Performed scaled-down Drive Cycle tests with Type-1 Sub-prototype Tank. Both UDDS and HWFET drive cycles were executed. These were beyond the scope of our proposed program.
- Worked on Hydrogen feasibility for type 1 tanks for Toyota Motors (Subcontracted to University of Quebec).
- Worked with Savannah River National Laboratory for USDOE to establish the current envelope of targets for next-generation H2FCVs. Provided consultation to SRNL on testing.
- Hands down experience in Class 1 Division 2 Safety component selection and installation for hydrogen environment. Working knowledge of relevant SAE protocols.
- 12+ years of experience in hydrogen storage and 8+ years' experience in storage system development.

- Basic experience in Fuel-Cell stacks and their interfacing with hydrogen systems
- Hardware: Hands-on experience in building test bench systems with high pressure compressed gas (250 bar/3600 psi)/ultra-high vacuum (10^{-10} mbar), high hydrogen flow rate (90 g Hydrogen/minutes), and cryogenic (~10 K) measurement systems. Through knowledge of interfacing pressure, temperature, flow, load, mass, and Hall-effect sensors, single and multi-port valves, relays, circulation pumps, controllers, human machine interfaces, pneumatic actuators and PWM devices.
- Analytical instrumentations: GC, QMS, Leak detectors, meteorological pressure standards, load cells, sputtering and CVD systems and ultra-clean glove box workstations.
- Trained on Workplace Hazardous Materials Information System (WHMIS), Hydrogen safety, Transportation and use of liquid nitrogen, SIMDUT.

Major Accomplishments

- Invented and designed a low-cost, highly scalable and versatile stand-alone multi-component real gas mixing system with a low volume footprint. It is capable of producing gas mixtures with compositional accuracy better than 0.8 %. This invention saved equivalent to 40,000 $ (of a commercial gas mixing system) and was critical for our multicomponent adsorption studies. The real gas properties required for compositional mixing are dynamically obtained by calling NIST EOS' Refprop.dlls within LabVIEW.
- Designed and implemented an isotope exchange adsorption system, — a sophisticated test-rig that enables simultaneous probing of multicomponent gas adsorption equilibrium, kinetics, selectivity and isosteric heats on porous sorbents.
- Co-ordinated (Experimental team lead at UQTR) the development of a state-of-the-art flowthrough cooling workbench for testing thermal and storage performances of US DOE's vehicular hydrogen storage subscale prototype. We are currently testing a subscale prototype vehicular tank by fast filling it with 77 K hydrogen with rates of 1000 SLPM (90 gH2/minute).
- Designed, rendered and commissioned a state-of-the-art supervisory control and data acquisition system for the test bench that complies with the Class I Division 2 Hazardous Group B Locations for the test bench. Implemented a LED touch panel display as a low-cost remote readout device instead of using standard but expensive touch panel computer in a H2 filling test bench. Designed and constructed a liquid nitrogen level controller with continuous un-manned filling of cryogenic tanks.
- Guided the assembly of two commercial Dynetek 35 MPa compressed hydrogen tanks on a commercial trailer for transporting hydrogen from a refueling station to a hydrogen storage system test facility. Developed safe hydrogen discharging control unit for the Dynetek tanks which complies with the safety regulations of Transportation Canada and Quebec Transportation Ministry.
- Contributed to the US DOE's "Best practices for measurement of Hydrogen Storage and characterizing Engineering Properties of Hydrogen Storage materials", - definitive Hydrogen Storage Engineering Guidebooks. Provided 3-day consultation to Savannah River National Laboratory's (US DOE) Hydrogen Storage Centre of Excellence researchers for adsorption measurement.
- Developed a load cell system for compacting high surface area porous materials for high volumetric density hydrogen storage and optimization of compaction for the optimum material based storage systems. Established for the first time, a criterion for optimum volumetric storage capacity of MOFs.

- Parameterized experimentally measured adsorption isotherms on compacted porous sorbent materials using analytical models. Performed numerical modeling of multicomponent real gas adsorption using multi-potential theory of adsorption (MPTA) and Computation Fluid Dynamics simulation of hydrogen charging and discharging into a storage tank.
- Development of a semi-automatic Sieverts volumetric hydrogen storage equipment and standard Schlenk setup for moisture-sensitive complex hydride materials and performed hydrogen storage measurements on carbon nanomaterials, metal-carbon composites and complex chemical hydrides.
- Optimized seven process parameters and two noise parameters for the synthesis of carbon nanotubes using the Taguchi's orthogonal optimization of multi-parameter processes.
- Designed a plasma enhanced chemical vapor deposition system for thin films. Performed synthesis of CNT-nanometal hybrid systems for hydrogen storage applications.

Professional membership

International Partnership for Hydrogen Energy (2007-Present)
American Chemical Society
Materials Research Society (2005-2007)
Korean Chemical Research Society (2005-2007)
International Electrochemical Society (2006-2007)
German Physical Society (2004)

Languages

English, French and German