

Philippe Dauphin-Ducharme, Ph.D.
philippe.dauphin.ducharme@usherbrooke.ca

EMPLOYEMENT

Université de Sherbrooke

WINTER 2020 – Present

- Assistant professor on tenure track in the Chemistry department

EDUCATION

McGill University (*Graduate*)

FALL 2011 – SUMMER 2015

- Ph.D. in Materials Chemistry (Average: 3.9/4.0)

- Graduate supervisor: Prof. Janine Mauzeroll

Pierre et Marie Curie University (Paris VI) (*Undergraduate*)

WINTER 2011

- Joint Curriculum for Excellence in Molecular Chemistry (JCEMolChem) - M1S2 semester (Best average (17.7/20) of the group)

Université de Montréal (*Undergraduate*)

FALL 2008 – WINTER 2011

- BSc in Chemistry (Average: 4.1/4.3)

RESEARCH EXPERIENCE

University of California, Santa Barbara (*Post-graduate*)

FALL 2015 – FALL 2019

✓ Natural Sciences and Engineering Research Council of Canada (NSERC – PDF) and Fonds de Recherche Nature et technologies du Québec (FRQNT- B3) postdoctoral fellow in Prof. Kevin Plaxco's laboratory.

✓ Project 1: Development of electrochemical DNA biosensors for in vein and in brain measurements.

✓ Project 2: Electron transfer kinetics determination in electrochemical DNA sensors

✓ Project 3: DNA and protein folding biophysics on gold surfaces

McGill University (*Graduate*)

FALL 2011 – SUMMER 2015

✓ Thesis title: New Insights into Magnesium Alloys Corrosion using Scanning Probe Techniques

✓ Side project 1: Measuring the ability of DNA to mediate charge using electrochemistry

✓ Side project 2: Synthesis of redox and pH sensitive giant unilamellar vesicles

Pierre et Marie Curie University (Paris VI) (*Undergraduate*)

WINTER 2011

✓ JCEMolChem research internship with Prof. Hani Amouri

✓ Project: Synthesis of Iridium complexes bearing the prochiral intermediate “*o*-quinone methide”.

Université de Montréal (*Undergraduate*)

SUMMER 2010

✓ NSERC USRA research internship

✓ Supervisor: Prof. Garry S. Hanan

✓ Project: Synthesis of a new ligand architecture based on the guanidine functionality and complexation to various metal centers.

Université du Québec à Montréal (*Undergraduate, High-school*)

SUMMER 2007 and 2009

✓ NSERC USRA research internship

✓ Supervisors: Profs. Janine Mauzeroll and Steen B. Schougaard

✓ Project: Fabrication of a new ultramicroelectrode design of platinum with a gold ring. Synthesis of “scorpionates” ligands.

PUBLICATIONS

Philippe Dauphin-Ducharme, Ph.D.

a. Published/Accepted articles peer reviewed (25):

25. Arroyo-Currás, N., **Dauphin Ducharme, P.**, Scida, K., Chavez, J. L. From the Beaker to the Body: Translational Challenges for Electrochemical, Aptamer-Based Sensors. *Analytical Methods* **2020**, *12*, 1288-1310.
24. **Dauphin Ducharme, P.**, Yang, K., Arroyo-Currás, N., Ploense, K. L., Zhang, Y., Gerson, J., Kurnik, M., Kippin, T. E., Stojanovic, M. N., Plaxco, K. W. Electrochemical Aptamer-based Sensors for Improved Therapeutic Drug Monitoring and High-Precision, Feedback-controlled Drug Delivery *ACS Sensors* **2019**, *4*, 2832-2837.
23. **Dauphin Ducharme, P.**, Arroyo-Currás, N., Plaxco, K. W. High-precision electrochemical measurements of the guanine-, mismatch- and length-dependence of electron transfer in surface-attached DNA are consistent with a collision-mediated mechanism. *Journal of the American Chemical Society* **2019**, *141*, 1304-1311.
22. Ortega, G., Kurnik, M., **Dauphin Ducharme, P.**, Li, H., Arroyo-Currás, N., Caceres, A., Plaxco, K. W. Surface attachment enhances the thermodynamic stability of protein L. *Angewandte Chemie – International Edition* **2019**, *58*, 1714-1718.
21. **Dauphin Ducharme, P.**, Arroyo-Currás, N., Adhikari, R., Somerson, J., Ortega, G., Makarov, D., Plaxco, K. W. Chains Dynamics Limit Electron Transfer from Electrode-Bound, Single-Stranded Oligonucleotides. *Journal of Physical Chemistry C* **2018**, *122*, 21441-21448.
20. Kurnik, M., Ortega, G., **Dauphin Ducharme, P.**, Li, H., Caceres, A., Plaxco, K. W. Quantitative measurements of protein-surface interaction thermodynamics. *Proceedings of the National Academy of Sciences of the United States of America* **2018**, *115*, 8352-8357.
19. Arroyo-Currás, N., **Dauphin Ducharme, P.**, Ortega, G., Ploense, K. L., Kippin, T. E., Plaxco, K. W. Real-time, sub-second-resolved measurement of specific molecules directly in the living body using chronoamperometrically interrogated E-AB sensors. *ACS Sensors* **2018**, *3*, 360-366. **SELECTED FOR COVER**
18. Li, H.*, **Dauphin Ducharme, P.***, Ortega, G., Plaxco, K. W. Calibration-free electrochemical biosensors supporting accurate molecular measurements directly in undiluted whole blood. *Journal of the American Chemical Society* **2017**, *139*, 11207-11213 *Shared Co-First Author. **SELECTED FOR ACS SELECT**
17. **Dauphin Ducharme, P.**, Arroyo-Currás, N., Kurnik, M., Ortega, G., Li, H., Plaxco, K. W. A Simulation-Based Approach to Determining Electron Transfer Rates using Square-Wave Voltammetry. *Langmuir* **2017**, *33*, 4407-4413.
16. Li, H., **Dauphin Ducharme, P.**, Arroyo-Currás, N., Tran, C., Vieira, P. A., Li, S., Shin, C., Somerson, J., Kippin, T. E., Plaxco, K. W. A biomimetic surface greatly improves the in-vivo performance of electrochemical aptamer-based sensors. *Angewandte Chemie – International Edition* **2017**, *56*, 7492-7495. **VERY IMPORTANT PAPER**
15. **Dauphin Ducharme, P.** and Plaxco, K. W. Maximizing the Signal Gain of Electrochemical-DNA Sensors. *Analytical Chemistry* **2016**, *88*, 11654–11662.
14. Polcari, D., **Dauphin Ducharme, P.**, Mauzeroll, J. Scanning Electrochemical Microscopy: A Comprehensive Review of Experimental Parameters from 1989-Present. *Chemical Reviews* **2016**, *116*, 13043-14276. **SELECTED FOR COVER**
13. **Dauphin Ducharme, P.**, Kuss, C., Rossouw, D., Payne, N., Danis, L., Botton, G. A., Mauzeroll, J. Corrosion Product Formation Monitored Using the Feedback Mode of Scanning Electrochemical Microscopy with Carbon Microelectrodes. *Journal of the Electrochemical Society* **2015**, *162*, C677-C683.
12. Tefashe, U. M., **Dauphin Ducharme, P.**, Danaie, M., Cano, Z. P., Kish, J. R., Botton, G. A., Mauzeroll, J. Localized Corrosion Behavior of AZ31B Magnesium Alloy with an Electrodeposited Poly(3,4-Ethylenedioxythiophene) Coating. *Journal of the Electrochemical Society* **2015**, *162*, C536-544.

11. **Dauphin Ducharme, P.** and Mauzeroll, J. Surface Analytical Methods Applied to Magnesium Corrosion. *Analytical Chemistry* **2015**, *87*, 7499-7509. **SELECTED FOR COVER**
10. **Dauphin Ducharme, P.**, Binns, J. W., Snowden, M. E., Shoesmith, D. W., Mauzeroll, J. Determination of the local corrosion rate of magnesium alloys using a shear force mounted scanning microcapillary method. *Faraday Discussion* **2015**, *180*, 331-345.
9. **Dauphin Ducharme, P.**, Rosati, F., Greschner, A., De Bruijn, A. D., Salvatore, D., Toader, V., Lau, K. L., Mauzeroll, J., Sleiman, H. Modulation of Charge Transfer Across Double Stranded DNA by Site-Specific Incorporation of Copper bis-Phenanthroline Complexes. *Langmuir* **2015**, *31* 1850-1854.
8. Asmussen, R. M., Binns, J., Jakupi, P., **Dauphin Ducharme, P.**, Tefashe, U. M., Mauzeroll, J. and Shoesmith, D. W. Reducing the Corrosion Rate of Magnesium Alloys Using Ethylene Glycol For Advanced Electrochemical Imaging. *Corrosion Science* **2015**, *93*, 70-79.
7. **Dauphin Ducharme, P.**, Asmussen, R. M., Shoesmith, D. W. and Mauzeroll, J. In-situ Mg²⁺ Release Monitored during Magnesium Alloy Corrosion. *Journal of Electroanalytical Chemistry* **2015**, *736*, 61-68.
6. **Dauphin Ducharme, P.**, Asmussen, R. M., Tefashe, U. M., Danaie, M., Binns, J., Jakupi, P., Botton, G. A., Shoesmith, D. W. and Mauzeroll, J. Local Hydrogen Fluxes Correlated to Microstructural Features of a Corroding Sand Cast AM50 Magnesium Alloy. *Journal of the Electrochemical Society* **2014**, *161*, C557-C564.
5. Cottenye, N., Carbajal, G., Cui, Z.-K., **Dauphin Ducharme, P.**, Mauzeroll, J., Lafleur, M. Formation, stability, and pH sensitivity of stable, free-floating, giant unilamellar vesicles using palmitic acid-cholesterol mixtures. *Soft Matter* **2014**, *10*, 6451-6456.
4. Tefashe, U. M., Snowden, M. E., **Dauphin Ducharme, P.**, Danaie, M., Botton, G. A., Mauzeroll, J. Local flux of hydrogen from magnesium alloy corrosion investigated by scanning electrochemical microscopy. *Journal of Electroanalytical Chemistry* **2014**, *720-721*, 121-127.
3. Pal, A. K., **Dauphin Ducharme, P.**, Hanan, G. S. Enhanced stereoselectivity in a di-Ru(II) complex of an achiral bis-bidentate ligand. *Chemical Communications* **2014**, *50*, 3303-3305.
2. Trinh, D., **Dauphin Ducharme, P.**, Tefashe, U. M., Kish, J., Mauzeroll, J. Influence of Edge Effects on Local Corrosion Rate of Magnesium Alloy/Mild Steel Galvanic Couple. *Analytical Chemistry* **2012**, *84*, 9899-9906.
1. Nag, S., Ferreira, J. G., Chenneberg, L., **Dauphin Ducharme, P.**, Hanan, G. S., La Ganga, G., Serroni, S., Campagna, S. Changing the Role of 2,2'-Bipyridine from Secondary Ligand to Protagonist in [Ru(bpy)₂(N-N)]²⁺ Complexes: Low-Energy, Red Emission from a Ruthenium(II)-to-2,2'-Bipyridine ³MLCT State. *Inorganic Chemistry* **2010**, *50*, 7-9.

HONORS

Awards

- ISE Young Electrochemist Travel Award (August 2019) - Attributed every year to 8 young electrochemists (must have obtained Ph.D. not earlier than 6 years before) who intend to participate in the annual meeting of the International Society of Electrochemistry.
- Pall Dissertation Award – Awarded by the Department of Chemistry of McGill University to an outstanding doctoral student who is in the last six months of the Ph.D. program (July 2015) – *Institutional*
- Edward G. Weston Award – Awarded by the Electrochemical Society (Summer 2013) – *International*
- J. E. Griffiths Award – Awarded by the Faculty of Science of McGill University to an outstanding incoming graduate student pursuing studies and research in material sciences in the Faculty of Science (Winter 2012) – *Institutional*
- Plaque des Industries Chimiques – Awarded by the Société des industries chimiques du Canada to the best BSc. graduating student (Winter 2011) – *Provincial*
- Bourse Lucien Piché – Awarded by the Fondation Lucien-Piché to Quebec university students who are Philippe Dauphin-Ducharme, Ph.D.

in the final year of undergraduate programs (Fall 2010) – *Provincial*

- Bourse de prestige de l'Université de Montréal – Awarded by the Department of Chemistry of the University of Montreal to the student with the best grade point average (Fall 2010) – *Institutional*

Fellowships

- Natural Sciences and Engineering Research Council of Canada (NSERC) – PDF (Fall 2016 – Fall 2018) – *National*
- Fonds de la recherche sur la nature et les technologies (FRQNT) – Post-doctoral fellowship (B3) (Fall 2015 – Fall 2017) - *Provincial*

Scholarships

- Natural Sciences and Engineering Research Council of Canada (NSERC) – PGSD (Fall 2013 – Fall 2016) – *National*
- Fonds de la recherche sur la nature et les technologies (FRQNT) – B2 (Fall 2013 – Fall 2016) – *Provincial*
- NSERC – PGSM (Fall 2011 – Fall 2012) - *National*
- FRQNT – B1 (Fall 2011 – Fall 2013) - *Provincial*
- Joint Curriculum for Excellence in Molecular Chemistry (JCEMolChem) (Winter 2011) – *International*

Communication

- Award for best oral presentation – Canadian Society of Chemistry (CSC) National Meeting (June 2015) – *National*
- Award for the 2nd best thesis in 180s – Centre Québécois sur les Matériaux Fonctionnels (CQMF) (November 2014) - *Provincial*
- Award for the 2nd best poster presented – Electrochemical Society Canada (November 2013) – *National*
- Award for the 2nd best poster presented – NACE Northern Area Eastern Conference 2012 – *International*
- Award for the best poster presented by an undergraduate student - Symposium annuel de chimie inorganique du Québec (SACIQ) 2010 – *Provincial*