



Michèle Auger

Professor
Biophysical Chemistry

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Place and Date of Birth Born in Grand-Mère, Québec, Canada
March 30th, 1963

Academic Background

Postdoctoral Fellow		1990-1991
Massachusetts Institute of Technology		
<i>Supervisor</i> : Dr. Robert G. Griffin		
Ph.D. (Chemistry)	University of Ottawa	1986-1990
<i>Supervisor</i> : Dr. Ian C.P. Smith		
B.Sc. (Chemistry)	Université du Québec à Trois-Rivières	1982-1985

Positions Held - Université Laval

Member	CQMF*	2009-present
Member	PROTEO (formerly CREFSIP**)	2007-present
Chair of Undergraduate Studies	Department of Chemistry	2005-2013
Chair of Graduate Studies	Department of Chemistry	2004-2005
Acting Chair of Graduate Studies	Department of Chemistry	2002-2003
Associate Member	CREFSIP	2000-2007
Full Professor	Department of Chemistry	2000-present
Associate Professor	Department of Chemistry	1996-2000
Member	CERSIM*** (now CERMA****)	1991-present
Assistant Professor	Department of Chemistry	1991-1996

* CQMF (Quebec Network on Functional Materials)
** PROTEO, CREFSIP (Protein Function, Engineering and Applications Network)
*** CERSIM (Macromolecular Science and Engineering Research Center)
**** CERMA (Advanced Materials Research Center)

Distinctions, Awards and Scholarships

- › Laureate, Events held in 2017, Cercle des ambassadeurs de Québec, Organization of the 20th ISMAR (International Society for Magnetic Resonance) Meeting
- › Michèle Auger Service Award for Outstanding Service to the Biophysical Society of Canada (Inaugural award), Biophysical Society of Canada, 2016
- › ADRIQ Relève Technoscience « Coup de cœur » Award, École des protéines, 2016
- › Prix Première Étoile Orientante, École des protéines, Association québécoise d'information scolaire et professionnelle (AQISEP), 2016
- › Award “Hommage aux innovations sociales”, Attraction chimique, Université Laval, 2014
- › Award for Best Chair of Undergraduate Studies, Université Laval, 2013
- › ADRIQ Relève Technoscience Award, Attraction chimique, Université Laval, 2012
- › Professeure étoile (Teaching Award), Faculty of Science and Engineering (FSG), Université Laval, 1999, 2002, 2004, 2005, 2010, 2011, 2012
- › “Best Professor in Chemistry”, FSG, Université Laval, 1997, 2011

- › Nomination, Gala Femmes de mérite, YWCA, Education Category, 2011
- › Fellow of the Chemical Institute of Canada, 2010
- › Women in Science Award, YWCA Quebec Division, Quebec City, 2008
- › Clara Benson Award, Canadian Society for Chemistry, 2007
- › Barringer Award, Spectroscopy Society of Canada, 2002
- › Women's Faculty Award, Natural Sciences and Engineering Research Council of Canada (NSERC), 1991-1996 (250 K\$)
- › Governor General's Gold Medal, Graduate Studies, University of Ottawa, 1990
- › Postdoctoral Fellowship, NSERC, 1990-1991
- › 1967 Science and Engineering Scholarship, NSERC, 1986-1989
- › FCAR PhD Scholarship (declined), 1988-1989
- › FCAR Master Scholarship (declined), 1986-1987
- › Entrance Scholarship, University of Ottawa, 1986-1989
- › Undergraduate Research Scholarship, NSERC, 1984-1985

Membership in Scientific Organizations

- › Member of the Biophysical Society (USA) (since 1988)
- › Member and Secretary of the Biophysical Society of Canada
- › Member of the Canadian Society for Chemistry
- › Member of the « Association des communicateurs scientifiques » du Québec

Students Supervised and Co-supervised

- › Supervised: 13 PhD students and 35 Master students
- › Co-supervised: 7 PhD students and 12 Master students
- › 12 postdoctoral fellows
- › 1 research assistant
- › 63 undergraduate students
- › 14 international trainees

Research Interests

Study of the structure and dynamics of biological macromolecules by solid-state NMR and vibrational spectroscopy

- › Interaction between novel antimicrobial peptides and model membranes
- › Interaction between amyloid peptides and membranes
- › Study of spider silk
- › Synthesis and characterization of fluorinated lipids

Participation to Different Committees (last 10 years)

- › Member of the Users Advisory Committee, National Ultrahigh-Field NMR Facility for Solids, University of Ottawa, National Research Council, 2017-present
- › Member of the ISMAR (International Society for Magnetic Resonance) Council, 2013-present
- › Member of the Committee on the Prevention of Suicide, Université Laval, 2012-present
- › Member of the Editorial Board of *Biophysical Reviews*, 2011-present
- › Member of the IUPAB (International Union of Pure and Applied Biophysics) Council, 2011-2017
- › Member of the Editorial Advisory Board of the *Canadian Journal of Chemistry*, 2009-2012
- › Member of the « Comité paritaire sur le rattachement double » du Syndicat des Professeurs de l'Université Laval, 2009-2017
- › Member of the CREPUQ Committee for the evaluation of the PhD program in Chemistry at the Université du Québec à Montréal, 2007
- › Member of the Committee on International Science, Engineering and Technology

(CISER) of the National Research Council, 2003-2008

- Member of the Steering Committee, National Ultrahigh-Field NMR Facility for Solids, University of Ottawa, National Research Council, 2002-2017
- Member of the Management Committee, Eastern Canada High-Field NMR Facility, University of Montreal and McGill, 2002-2008

Organization of Meetings and Events (Last 10 years)

- Organizer of the 20th ISMAR Meeting held in Quebec City, July 23-28, 2017
- Co-organizer of the event *The 24 Hours of Chemistry* held in the Department of Chemistry at Université Laval, 2006, 2009, 2012, 2015 and 2018
- Co-organizer of the Symposium *Advances in Solid-State NMR of Biological Molecules* at Pacifichem 2015, Honolulu (Hawaii), December 15-20, 2015
- Student Volunteer Coordinator and Organizer of two symposia, *Canadian Chemistry Conference*, Quebec City, May 26-30, 2013
- Co-organizer of the *MOOT NMR Minisymposium*, Université Laval, October 20-21, 2012
- Co-organizer of the exhibit *100 years of Chemistry in Quebec*, Expo Québec Science Pavilion, August 17-28, 2011
- Co-organizer of the Symposium *Advances in Solid-State NMR of Biological Molecules* at Pacifichem 2010, Honolulu (Hawaii), December 15-20, 2010
- Co-organizer of the *International Conference on Organized Molecular Films*, LB-13, held in Quebec City, July 19-23, 2010
- Co-organizer of the event *Les filles et les sciences, un duo électrisant*, Université Laval, February 16th, 2008

Scientific Contributions

- 128 scientific publications
- 8 book chapters
- 3 conference proceedings
- 106 invited scientific lectures
- 32 invited outreach lectures
- 549 communications at scientific meetings

Scientific Publications (Last 6 years)

128. Gagnon, M.-C., Auger, M., Paquin, J.-F., **2018**. *Progress in the synthesis of fluorinated phosphatidylcholines for biological applications*, *Org. Biomol. Chem.*, 10.1039/c8ob00991k.
127. Martial, B., Lefèvre, T., Auger, M., **2018**. *Understanding amyloid fibril formation using protein fragments: structural investigations via vibrational spectroscopy and solid-state NMR*, *Biophys. Rev.*, 10.1007/s12551-018-0427-2.
126. Potvin-Fournier, K., Valois-Paillard, G., Gagnon, M.-C., Lefèvre, T., Audet, P., Cantin, L., Paquin, J.-F., Salesse, C., Auger, M., **2018**. *Novel approaches to investigate the interaction of recoverin with membranes*, *Eur. Biophys. J.*, 10.1007/s00249-018-1304-4.
125. Le, Q.C., Lefèvre, T., C.-Gaudreault, R., Laroche, G., Auger, M., **2018**. *Transdermal diffusion, spatial distribution and physical state of a potential anticancer drug in mouse skin as studied by diffusion and spectroscopic techniques*, *Biomed Spectrosc Imaging*, 7, 47-61.
124. Auger, M., Lefèvre, T., Otis, F., Voyer, N., Auger, M., **2018**. *Lipid membrane interactions of a fluorinated peptide with potential ion channel-forming ability*, *Peptide Sci.*, 10.1002/pep2.24051.
123. Gagnon, M.-C., Ouellet, P., Auger, M., Paquin, J.-F., **2018**. *Towards the use of monofluorinated dimyristoylphosphatidylcholines as ¹⁹F NMR reporters in bacterial model membranes*, *J. Fluorine Chem.*, 206, 43-47.
122. Gagnon, M.-C., Strandberg, E., Ulrich, A.S., Paquin, J.-F., Auger, M., **2018**. *New insights into the influence of monofluorination on dimyristoylphosphatidylcholine membrane properties: A solid-state NMR study*, *Biochim. Biophys. Acta*, 1860, 654-663.
121. Dionne, J., Lefèvre, T., Bilodeau, P., Lamarre, M., Auger, M., **2017**. *A quantitative analysis of the supercontraction-induced molecular disorientation of major ampullate*

- spider silk, *Phys. Chem. Chem. Phys.*, 19, 31487-31498.
120. Xu, L., Lefèvre, T., Orrell, K.E., Meng, Q., Auger, M., Rainey, J.K., Liu, X.-Q., **2017**. Structural and mechanical roles for the C-terminal non-repetitive domain become apparent in recombinant spider aciniform silk, *Biomacromolecules*, 18, 3678-3686.
 119. Gagnon, M.-C., Dautrey, S., Bertrand, X., Auger, M., Paquin, J.-F., **2017**. A flexible synthetic approach to phosphatidylglycerols, *Eur. J. Org. Chem.*, 6401-6407.
 118. Potvin-Fournier, K., Valois-Paillard, G., Lefèvre, T., Cantin, L., Salesse, C., Auger, M., **2017**. Membrane fluidity is a driving force for recoverin myristoyl immobilization in zwitterionic lipids, *Biochem. Biophys. Res. Comm.*, 490, 1268-1273.
 117. Auger, M., **2017**. Membrane solid-state in Canada: A historical perspective, *Biochim. Biophys. Acta*, 1865, 1483-1489.
 116. Gagnon, M.-C., Strandberg, E., Grau-Campistany, A., Wadhvani, P., Reichert, J.; Bürck, J., Rabanal, F., Auger, M., Paquin, J.-F., Ulrich, A.S., **2017**. Influence of length and charge on the activity of α -helical amphipathic antimicrobial peptides, *Biochemistry*, 56, 1680-1695.
 115. Fillion, M. Goudreault, M., Voyer, N., Bechinger, B., Auger, M., **2016**. Amphiphilicity is a key determinant in the membrane interactions of synthetic 14-mer cationic peptide analogs, *Biochemistry*, 55, 6919-6930.
 114. Godbout, R., Légaré, S., Auger, M., Carpentier, C., Otis, F., Auger, M., Lagüe, P., Voyer, N., **2016**. Membrane assembly and ion transport ability of a fluorinated nanopore, *PLOS ONE*, 11, E0166587.
 113. Duque, A. Gauthier, L., Simard, M., Jean, J., Gendreau, I., Morin, A., Auger, M., Soucy, J., Pouliot, R., **2016**. A 3D-psoriatic skin model for dermatological testing: The impact of culture conditions, *Biochem. Biophys. Rep.*, 8, 268-276.
 112. Dionne, J., Lefèvre, T., Auger, M., **2016**. Major ampullate spider silk with indistinguishable spidroin dope conformations lead to different fiber molecular structures, *Int. J. Molec. Sci.*, 17, E1353.
 111. Potvin-Fournier, K., Lefèvre, T., Picard-Lafond, A., Marcotte, C., Dufresne, C., Cantin, L., Salesse, C., Auger, M., **2016**. Discriminating lipid- from protein-calcium binding to understand the interaction between recoverin and phosphatidylglycerol model membranes, *Biochemistry*, 55, 3481-3491.
 110. Lefèvre, T., Auger, M., **2016**. Spider silk as a blueprint for greener materials: a review, *Int. Mater. Rev.*, 61, 127-153.
 109. Lefèvre, T., Auger, M., **2016**. Spider silk-inspired materials and sustainability: perspective, *Mater. Technol: Advanced Performance Materials*, 31, 384-399.
 108. Robert, É., Lefèvre, T., Fillion, M., Martial, B., Dionne, J., Auger, M., **2015**. *Mimicking and understanding the agglutination effect of the antimicrobial peptide thanatin using model phospholipid vesicles*, *Biochemistry*, 54, 3932-3941.
 107. Tremblay, M.-L., Xu, L., Lefèvre, T., Sarker, M., Orrell, K.E., Leclerc, J., Meng, Q., Pézolet, M., Auger, M., Liu, X.-Q., Rainey, J.K., **2015**. *Spider wrapping silk fibre architecture arising from its modular soluble protein precursor*, *Sci. Reports*, 10.1038/srep11502.
 106. Leroy, M., Lefèvre, T., Pouliot, R., Auger, M., Laroche, G., **2015**. *Using infrared and Raman microspectroscopies to compare ex vivo involved psoriatic skin with normal human skin*, *J. Biomed. Opt.*, 10.1117/1.JBO.20.6.067004.
 105. Rhéault, J.-F., Gagné, E., Guertin, M., Lamoureux, G., Auger, M., Lagüe, P., **2015**. *Molecular model of hemoglobin N from Mycobacterium tuberculosis bound to lipid bilayers: a combined spectroscopic and computational study*, *Biochemistry*, 54, 2073-2084.
 104. Huot, A., Lefèvre, T., Rioux-Dubé, J.-F., Nault, A.-P., Auger, M., Pézolet, M., **2015**. *Effect of mechanical deformation on the structure of regenerated B. mori silk fibroin films as revealed by Raman and infrared spectroscopy*, *Applied Spectroscopy*, 69, 689-698.
 103. Ayata, R.E., Chabaud, S., Auger, M., Pouliot, R., **2015**. *Behaviour of endothelial cells in a tridimensional in vitro environment*, *BioMed Research International*, 630461, 10.1155/2015/630461.
 102. Fillion, M., Auger, M., **2015**. *Oriented samples: a tool for determining the membrane topology and the mechanism of action of cationic antimicrobial peptides by solid-state NMR*, *Biophys. Rev.*, 7, 311-320.
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101. Proulx, M., Aubin, K., Lagueux, J., Audet, P., Auger, M., Fortin, M.-A., Fradette, J., **2015**. *Magnetic resonance imaging of human tissue-engineered adipose substitutes*, *Tissue Eng. Part. C.*, **21**, 693-704.
 100. Fillion, M., Valois-Paillard, G., Lorin, A., Noël, M., Voyer, N., Auger, M., **2015**. *Membrane interactions of synthetic peptides with antimicrobial potential: Effect of electrostatic interactions and amphiphilicity*, *Probiotics & Antimicro. Prot.*, **7**, 66-74.
 99. Gauthier, M., Leclerc, J., Lefèvre, T., Gagné, S.M., Auger, M., **2014**. *Effect of pH on the structure of the recombinant C-terminal domain of Nephila clavipes dragline silk protein*, *Biomacromolecules*, **15**, 4447-4454.
 98. Ayata, R.E., Bouhout, S., Auger, M., Pouliot, R., **2014**. *In vitro construction and evaluation of capillarylike structures in psoriatic skin substitutes*, *BioResearch Open Access*, **3**, 197-205.
 97. Bédard, L., Lefèvre, T., Morin-Michaud, É., Auger, M., **2014**. *Besides fibrillation: the role of the peptide fragment 71-82 on the structural and assembly behavior of α -synuclein*, *Biochemistry*, **53**, 6463-6472.
 96. Gagnon, M.-C., Turgeon, B., Savoie, J.-D., Parent, J.-F., Auger, M., Paquin, J.-F., **2014**. *Evaluation of the effect of fluorination on the property of monofluorinated dimyristoylphosphatidylcholines*, *Org. Biomol. Chem.*, **12**, 5126-5135.
 95. Leroy, M., Labbé, J.-F., Ouellet, M., Jean, J., Lefèvre, T., Laroche, G., Auger, M., Pouliot, R., **2014**. *Characterization of healthy human skin substitutes by Raman microspectroscopy*, *Acta Biomater.*, **10**, 2703-2711.
 94. Fillion, M., Noël, M., Lorin, A., Voyer, N., Auger, M., **2014**. *Investigation of the mechanism of action of novel amphipatic peptides: Insights from solid-state NMR studies of oriented lipid bilayers*, *Biochim. Biophys. Acta*, **1838**, 2173-2179.
 93. Potvin-Fournier, K., Lefèvre, T., Picard-Lafond, A., Valois-Paillard, G., Cantin, L., Salesse, C., Auger, M., **2014**. *The thermal stability of recoverin depends on calcium binding and its myristoyl moiety as revealed by infrared spectroscopy*, *Biochemistry*, **53**, 48-56.
 92. Leroy, M., Lafleur, M., Auger, M., Laroche, G., Pouliot, R., **2013**. *Characterization of the structure of human skin substitutes by infrared microspectroscopy*, *Anal. Bioanal. Chem.*, **405**, 8709-8718.
 91. Leclerc, J., Lefèvre, T., Gauthier, M., Gagné, S., Auger, M., **2013**. *Hydrodynamical properties of recombinant spider silk proteins: Effects of pH, salts and shear, and implications for the spinning process*, *Biopolymers*, **99**, 582-593.
 90. Otis, F., Auger, M., Voyer, M., **2013**. *Exploiting peptide nanostructures to construct functional artificial ion channels*, *Acc. Chem. Res.*, **46**, 2934-2943.
 89. Labbé, J.-F., Lefèvre, T., Guay-Bégin, A.-A., Auger, M., **2013**. *Structure and membrane interactions of the β -amyloid fragment 25-35 as viewed by spectroscopic approaches*, *Phys. Chem. Chem. Phys.*, **15**, 7228-7239.
 88. Paquet-Mercier, F., Lefèvre, T., Auger, M., Pézolet, M., **2013**. *Evidences by infrared spectroscopy of the presence of two types of β -sheets in major ampullate spider silk and silkworm silk*, *Soft Matter*, **9**, 208-215.
 87. Lorin, A., Noël, M., Provencher, M.-E., Turcotte, V., Cardinal, S., Lagüe, P., Voyer, N., Auger, M., **2012**. *Determining the mode of action involved in the antimicrobial activity of synthetic peptides from FTIR and solid-state NMR experiments*, *Biophys. J.*, **103**, 1470-1479.
 86. Leclerc, J., Lefèvre, T., Pottier, F., Morency, L.-P., Lapointe-Verreault, C., Gagné, S., Auger, M., **2012**. *Structure and pH-induced alterations of recombinant and natural spider silk proteins in solution*, *Biopolymers*, **97**, 337-346.
 85. Guimond-Tremblay, J., Turcotte, V., Gagnon, M.-C., Auger, M., Paquin, J.-F., **2012**. *Synthetic and properties of monofluorinated dimyristoylphosphatidylcholine derivatives: Potential fluorinated probes for the study of membrane topology*, *Org. Biomol. Chem.*, **10**, 1145-1148.
- Book Chapters**
8. Lefèvre, T., Byette, F., Marcotte, I., Auger, M., **2014**. *Protein- and peptide-based materials: a source of inspiration for innovation*, in “*Textbook on Functional Organic Materials*”, R. Gauvin and M. Leclerc, Eds., De Gruyter, pp 415-442.

7. Fillion, M., Voyer, N., Auger, M., **2014**. *Membrane interactions of amphiphilic peptides with antimicrobial potential: A solid-state NMR study*, in "Advances in Biological Solid-State NMR: Proteins and Membrane-Active Peptides", F. Separovic and A. Naito, Eds., Royal Society of Chemistry, Cambridge, UK, pp 200-213.

**Article Promoting
Research Project**

1. Pouliot M., Auger, M., **2012**. *The reconstruction of psoriatic skin*, International Innovation, Healthcare Issue 16, 76-78.

**Invited Scientific
Talks (last 6 years)**

106. 2nd Annual Meeting of the Biophysical Society of Canada, Winnipeg (Manitoba), June 2, **2016**.
 105. Institut de physique de Rennes, Université de Rennes 1, Rennes (France), April 19, **2016**.
 104. 98th Canadian Chemical Society Conference and Exhibition, Ottawa (Ontario), June 15, **2015**.
 103. INRS-Institut Armand-Frappier, Laval (Québec), August 7, **2014**.
 102. Atomic View of Biomolecular Function Symposium, University of Michigan, Ann Arbor (Michigan), July 11-13, **2013** (could not attend due to illness).
 101. 8th Annual Solid-State NMR Workshop, National Ultrahigh Field NMR Facility for Solids, Québec (Québec), May 26, **2013**.
 100. Département de chimie, Université du Québec à Montréal, Montréal (Québec), February 22, **2013**.
 99. Department of Chemistry, Hamilton College, Clinton (New York), October 26, **2012**.
 98. 95th Canadian Chemical Society Conference and Exhibition, Calgary (Alberta), May 28, **2012**.
 97. 95th Canadian Chemical Society Conference and Exhibition, Calgary (Alberta), May 28, **2012**.
 96. Defence Research and Development Canada, Valcartier, May 16, **2012**.
 95. 15th GEM (Groupe d'étude sur les membranes) Congress, Paris (France), April 4, **2012**.
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