

CURRICULUM VITAE

VINCENT TABARD-COSSA



DATE OF BIRTH: DECEMBER 6TH 1977
PLACE OF BIRTH: RIMOUSKI (QUÉBEC)
COUNTRY OF CITIZENSHIP: CANADA, FRANCE
LANGUAGES: FRANÇAIS, ENGLISH

DEPARTMENT OF PHYSICS
UNIVERSITY OF OTTAWA
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DEGREES:

Ph.D. Physics, McGill University, Canada, 2006.
B.Sc. Physics, McGill University, Canada, 2000.

EMPLOYMENT HISTORY:

2015-present	Associate Professor, Department of Physics, University of Ottawa.
2020-present	Co-founder and Chief Scientific Officer (part-time), Northern Nanopore Instruments.
2017-present	Cross-appointed, School of Electrical Engineering and Computer Science, University of Ottawa.
2016-2020	Adjunct Professor, Department of Physics, McGill University.
2010-2015	Assistant Professor, Department of Physics, University of Ottawa.
2010-2010	Visiting Scholar, Physics Department, McGill University.
2010-2010	Consultant, Stratos Genomics.
2008-2010	Postdoctoral Fellow, Department of Electrical Engineering and Biochemistry, Stanford Genome Technology Center, Stanford University.
2006-2008	Postdoctoral Fellow, Department of Physics and Astronomy, University of British Columbia.

ACADEMIC HONOURS (past 9 years):

- Member of the Royal Society of Canada's College of New Scholars, Artists and Scientists, 2019.
- University of Ottawa Young Researcher of the Year Award, 2017-2018.
- Ontario Early Researcher Award, 2016.

SCHOLARLY AND PROFESSIONAL ACADEMIC ACTIVITIES (past 10 years):

Invited Talks (39):

- 2021 "Elucidating transport of DNA nanostructures through nanopores for biosensing applications" 2021 Biophysical Society of Canada Meeting, Single-Molecule Biophysics session, May 26-28, 2021 [virtual]
- 2021 "Elucidating transport of DNA nanostructures through nanopores" Virginia Commonwealth University, Richmond, VA (USA) Colloquium, Department of Physics, April 23, 2021 [virtual]
- 2020 "Quantifying Biomarker Concentration" BiophysicsTO lunch time Seminar, University of Toronto, Ontario, Canada, November 26, 2020 [virtual]
- 2020 "Quantifying Protein Concentration from Serum using Solid-State Nanopores" Nanopore Electrochemistry Meeting on October 10 – 12, 2020, Nanjing, China [virtual]
- 2020 "Challenges and Opportunities of Electronic Sequencing with Solid-state Nanopores" Keynote at Applied Materials Inflection Forum, Beyond Moore's Law session, Las Vegas, (USA) on December 16, 2020. [cancelled due to pandemic]
- 2020 "Solid-State Nanopores electronic tools for analysis of polymers" Institut Charles Sadron, UPR22-CNRS, Strasbourg, (France) on June 16, 2020. [cancelled due to pandemic]
- 2020 "Capture of Translocation of Nanostructured DNA through Nanopores" From Solid-state to Biophysics, from Basic to Life Sciences 10, Nanopore and Nanofluidics, Cavtat, (Croatia) on June 6 – 14, 2020. [cancelled due to pandemic, but moved to 2022]
- 2019 "Exploring Capture and Passage of Linear & Nanostructured DNA through Nanopores" California State University Northridge, Department of Physics, Northridge, CA (USA)
- 2019 "Advancing Nanopore Sensing with DNA nanostructures and Nanofilters" University of Utah, Department of Chemistry, Salt Lake City, UT (USA)
- 2019 "Counting is easier than integrating - advancing nanopores for biomarker detection" National Institute of Standard and Technology - NIST, Gaithersburg, MD (USA)
- 2019 "Nanofabrication of Nanofluidic Devices for Single-Molecule Detection" NanoCanada at Kanata North, Ottawa, Canada
- 2019 "Nanomembranes and Nanopores for Ultra-sensitive Biomarker Detection" Center of Advanced Material Research (CAMaR), Bio and Nanomaterials for Clinical Translation Workshop, Ottawa, Canada
- 2018 "Applications of Nanofiltered-Nanopore Devices: from Conformational Control to Entropic Trapping" From Solid-state to Biophysics, from Basic to Life Sciences 9, Nanopore and Nanofluidics, Cavtat, (Croatia)
- 2017 "Commercialization of Solid-State Nanopore-based Technologies", Barriers to Commercialization Panel, Converging on Nanomanufacturing, NanoCanada Symposium, Montreal, QC (Canada)
- 2017 "Kinetics of polymer translocation through nanopores under nanoscale pre-confinement" presented by K. Briggs, Biophysical Society of Canada, Montreal, QC (Canada)
- 2017 "Nanopores and Nanomembranes for Single-Molecule Biophysics" ONEBiophysics Meeting Schedule, University of Toronto at Mississauga, Mississauga ON (Canada)
- 2016 "Democratizing Nanopore-based Single-Molecule Research", SciX Conference, Minneapolis, MN (USA)
- 2016 "The Potential and Challenges of Solid-State Nanopore-based Single-Molecule Sensing" BioMolar seminar, Department of Chemistry and Biomolecular Sciences, University of Ottawa, Ottawa ON (Canada)
- 2016 "Nanopores and Nanomembranes for Biomedical Applications", Rochester Advanced Material Program Annual Symposium, Frontiers in Materials Science for the 21st Century MEMS and Membranes, University of Rochester, Rochester NY (USA)

- 2016 “Democratizing Solid-State Nanopore Research” Physics seminar, Brown University, Providence RI (USA)
- 2015 “Nanomanufacturing Nanopore-based Technologies” 6th Annual NanoOntario Conference, University of Ottawa, Ottawa ON (Canada)
- 2015 “Sequencing on an iPhone”, Physics seminar, Carleton University, Ottawa ON (Canada)
- 2015 “Interfacing Solid-State Nanopores with Gel Media to Slow DNA Passage Speeds”, Selective transport through nanopores: physics meets biology conference, Lenzerheide (Switzerland), 2015
- 2014 “Democratizing Nanopore-based Research”, McGill Physical Society Colloquium, McGill University, Montréal QC (Canada), 2014
- 2014 “Democratizing Nanopore-based Single-Molecule Studies”, Gordon Research Conference, Single-Molecule Approaches to Biology, Renaissance Tuscany Il Ciocco Resort, Barga (Italy), 2014
- 2014 “Low-Cost, Scalable Fabrication of Nanopore Devices for Sequencing and Clinical Diagnostic Applications”, 4th Next-Generation Sequencing Meeting, Nucleic Acid Summit, San Diego CA (USA), 2014
- 2014 “Nanopore-based DNA Sequencing – toward testing on the i-STAT?”, Abbott Point-of-Care, Ottawa ON (Canada), 2014
- 2014 “Nanopores Fabricated by Controlled Dielectric Breakdown for Nucleic Acid Analysis”, University of Rochester, Rochester NY (USA), 2014
- 2013 “Nucleic Acid Analysis with Nanopores”, University of Saskatchewan, Department of Biochemistry, Saskatoon SK (Canada) 2013
- 2013 “Single-Molecule Biophysics and Electronic Sequencing with Nanopores”, University of Toronto, Department of Physical and Chemical Sciences, Mississauga ON (Canada), 2013
- 2013 “Control of DNA Capture and Passage by Nanofluidic Transistors”, Canadian Association of Physicists, 68th CAP congress, Montreal QC (Canada), 2013
- 2013 “Extremely low-cost fabrication of solid-state nanopores by controlled dielectric breakdown in aqueous solution”, National Human Genome Research Institute (NHGRI) Advanced Sequencing Technology Development Meeting, San Diego CA (USA), 2013
- 2013 “Single-Molecule Biophysics with Nanopores”, Dalhousie University, Department of Physics, Halifax NS (Canada), 2013
- 2012 “Solid-State Nanopores: Electronic Tools for Single-Molecule Analysis”, keynote lecture at the Symposium D7. Pits and Pores 5: A symposium in Honor of David Lockwood, 222nd ECS Meeting, Honolulu Hawaii (USA), 2012
- 2012 “Solid-State Nanopores: Electronic Tools for Single-Molecule Biophysics” NRC-IMS, Ottawa ON, (Canada).
- 2011 “Solid-State Nanopores: Electronic Tools for Single-Molecule Biophysics” Ottawa Carleton Institute for Physics 2011 Christmas Symposium, Ottawa ON, (Canada).
- 2011 “Nanopores - Electronic Tools for NanoBiotechnologies” Centre Énergie Matériaux Télécommunications de l’Université INRS, Varennes QC, (Canada).
- 2011 “Nanopores: Electronic Tools for Single-Molecule Biophysics and Bio-Nanotechnologies” Molecular Devices, Axon Conventional Electrophysiology Webinar CA, (USA).
- 2011 “Nanopores à l’état solide – perspectives pour le séquençage de l’ADN” session 215 - Biophysique cellulaire et moléculaire – ACFAS, Sherbrooke QC, (Canada).

Referee, Editorial and Event Administration Activities:

- Subject Editor (2020-2023), Editorial Board Member, FACETS - Canada’s first multidisciplinary and interdisciplinary open access science journal.

- Member of National Human Genome Research Institute (NHGRI) special emphasis panel for their Advanced Nucleic Acid Sequencing Technology 2018, 2019, 2020 and 2021 competition.
- Organizing Committee, 2022 BSC Conference (Biophysical Society of Canada) May 2022
- Program committee, ICN+T 2020/2021 in Vancouver (International Conference on Nanoscience and Technology, Conference, 2021/7 - 2021/7)
- Organizing Committee, 2016 CAP Congress (Canadian Association of Physicists), Conference, 2016/6 - 2016/6
- I was a member of the NSERC Research Tools and Instrumentations (RTI) Review Committee (Physics - 1605) for the 2016-2017 competition.
- I was a reviewer for Fonds Québécois de Recherche sur la Nature et les Technologies (FQRNT) - Evaluation of grant applications - Program for new researchers 2011-2012 - multidisciplinary committee NC01 (biology, chemistry, geography, physics).
- I was also recruited to serve as external reviewers for a number of grants, from Canada, Singapore, and EU.
- I also reviewed two tenure dossiers for universities in the US.

Academic Collaborations:

I have developed a strong network of national and international collaborators composed of:

Active collaborations:

- Prof. J. McGrath, Biomedical Engineering, University of Rochester (USA)
 - Publications: 3
 - Funding: NIH R21 2017-2020, NIH R01 2021-2025
- Prof. H. de Haan, Physics, UOIT
 - Publications: 2
 - Funding: active NSERC CRD grant 2019-2022
- Prof. Mark S. Freedman and Dr. Simon Thebault, Ottawa Hospital Research Institute and Neurology, Medicine uOttawa (testing MS patient sample using a digital immunoassay technology for a clinical study)
 - Publications: 3
 - Funding: Department of Medicine (DoM) Research Award for 2018-2019; Excelsior Translational program via OHRI and the Faculty of Medicine in 2021.
- Prof. M. Godin, Physics, uOttawa
 - Publications: 5 + 2 submitted
 - Funding: active NSERC CRD grant 2019-2022
- Dr. J. Robertson, NIST (USA)
 - Funding: NIST internal funding 2019-2022
- Prof. J. Pezacki, Chemistry, uOttawa
 - Funding: NSERC Alliance – Special COVID-19 funding 2020-2022
- Prof. J.F. Lutz, Chemistry, CNRS (Strasbourg, France)
 - Funding: Mourou-Strickland Mobility grant – Consulat Général de France – (delay due to pandemic)

Previous collaborations:

- Prof. W. Dunbar, Computer Engineering, UCSC (a publication in PLoS ONE in 2016)
- Prof. C. Schroeder, Chemical and Biomolecular Engineering, UIUC
- Dr. A. Balijepalli, Physical Measurement Laboratory, National Institute of Standards and Technology - NIST (a publication in Analytical Chemistry in 2016)
- Prof. A. Hall, School of Medicine, Wake Forrester University (a publication in Nanotechnology in

2017)

- Prof. G. Slater Physics, uOttawa (funded through NSERC CRD grant 2016-2018 and a publication in Electrophoresis in 2015)
- Prof. S. Leslie, Physics, McGill (Funded through NSERC RTI in 2015 and CRD grant 2015-2018)
- Prof. J. C. Scaiano, Chemistry and Biomolecular Sciences, uOttawa (funded through a Genome Canada grant 2016-2018)
- Prof. Robert Slinger, Children's Hospital of Eastern Ontario (CHEO), Medicine uOttawa (Infectious Disease Diagnostics) (Funded through a CHEO Research Growth Award 2019-2021, and a manuscript under review)

Industrial Collaborations:

- Abbott Point-of-Care (Ottawa, ON, Canada)
- Abbott Diagnostics (Chicago, IL, USA)
- Norcada (Edmonton, AB, Canada)
- SiMPore (Rochester, NY, USA)

SUPERVISION:

Graduate Supervision Completed: 8

In progress: 6, including 4 Ph.D., 2 MSc

Note: I trained 57 distinct Highly Qualified Personnel (HQP) since 2011, including:

- 41 undergraduate students (enrolled in Physics, Biochemistry or Engineering programs)
- 14 graduate students
- 11 postdoctoral fellows/research associates

COMPLETED (last 10 years)

Names of Completed Graduate Students (8):

- Wing Hei Harold Kwok (Ph.D.), Solid-State Nanopore Fabrication by Controlled Dielectric Breakdown, May 2011 – December 2014.
- Jose Bustamante (M.Sc.), Nano- and Microfluidics for single-molecule spectroscopy, August 2012 – August 2014.
- Matthew Waugh (M.Sc.), Modifying translocation kinetics and capture rate of biomolecules by interfacing a solid-state nanopore with a gel, May 2013 – April 2015.
- Radin Tahvildari (Ph.D.), Arrays of Solid-State Nanopore Biosensors Integrated with Microfluidics, September 2012 – December 2016 (co-supervised with Michel Godin)
- Philipp Karau (MSc.), Capture and Translocation Characteristics of Short Branched DNA Labels, January 2016 – January 2018
- Kyle Briggs (Ph.D.), Applications of Solid-State Nanopores, September 2013 – August 2018.
- Eric Beamish (Ph.D.), Multiplexed Detection of Analytes with Solid-State Nanopore Sensors, September 2012 – August 2019. (co-supervised with M. Godin)
- Martin Charron (MSc.), Capture of DNA fragments by Solid-state Nanopores, September 2016 – December 2019.

Names of Completed Postdoctoral Fellows, Research Associates and Engineers (8):

- Benjamin Watts (Physics) July 2014 – August 2015.
- Aidan Baker-Murray (Physics) December 2015 – December 2016
- Dylan Gunn (Engineering Physics) January 2016 – December 2017
- Ali Najafi Sohi, PhD (Mech. Eng.) January 2016 – October 2019 (co-supervised with M. Godin)
- Autumn Carlsen, PhD (Physics) January 2014 – December 2019
- Reza Rhanbabaie, Ph.D. (Physics), October 2019- April 2020 (co-supervised with M. Godin)
- Daniel Tessier, PhD (Biology) September 2016 – August 2020
- Quinn Ingram (Chem. Eng) – Research Assistant July 2020 – December 2020

Names of Completed Undergraduate Students (40):

- Mathew Rigby (Physics) January 2011 – May 2011.
- Jean Luc Rukundo (McGill Physics) May 2011 – August 2011.
- Edward Percy (Queen's Physics) May 2011 – August 2011.
- Mathew Waugh (Biochemistry) September 2011 – December 2011.
- Christopher Wlodarczyk (Physics) September 2011 – April 2012.
- Matthew Windeler (Physics) May 2012 – August 2012.
- Julien Thibert-Leduc (Physics) May 2012 – August 2012.
- Kyle Briggs (Physics) September 2012 – December 2012.
- Julie Montgomery (Physics) September 2012 – April 2013.
- Nicholas Yelle (Physics) January 2013 – April 2013.
- Callan Jessiman (high school) July 2013 – August 2013.
- Martin Charron (Physics) May 2013 – December 2013, and then May 2015 – August 2016.
- Pierre Janusz (Lyon, France Physics) September 2013 – April 2014.
- Timothea Le (Biochemistry) May 2014 – August 2014.
- Sanmeet Chahal (Physics) May 2014 – August 2014.
- David Hobson (Physics) May 2015 – August 2015.
- Erick Espindola (Physics) May 2015 – August 2015.
- An Duong (Biochemistry) May 2016 – August 2016.
- Giulio Pregnotato (UBC Engineering coop) September 2016 – December 2016
- Caroline Tippins (Physics) September 2015 – May 2017
- France Manigat (Biochemistry) January 2017 – August 2017
- Samuel Berryman (UBC Engineering coop) January 2017 – August 2017
- Mohammed Sayeem (Biochem./Chem. Eng. – full-time coop) Sept. 2017 – December 2017
- Amanda Alain (Biochemistry/Chem. Eng. – part-time honours) May 2017 – April 2018
- Melissa Jimenez (Bio Mech. Eng. – full-time coop) September 2017 – April 2018
- Michelle Vandelloo (Biochemistry – full-time coop) January 2018 – April 2018
- Michelle Lam (UBC Biophysics – full-time coop) September 2017 – August 2018
- Simon King (Biochemistry, minor in Biophysics) full-time coop and part-time researcher from May 2016 – December 2018
- Nathaniel Leslie (Chemistry – fulltime coop), September 2018 – December 2018
- Quinn Ingram (Biochem./Chem. Eng. – full-time coop, and part-time researcher from January 2018 – December 2018
- Guillaume Pregliasco (Chem. Eng.), fulltime coop and part-time researcher, September 2018 – April 2019
- Chelsea Leung (Waterloo, Nanoscience program) fulltime coop January 2019 - August 2019
- Smile (Xi Man) Peng (Engineering UofT) summer research May 2019 - August 2019
- Derek Boase (Physics), summer research and part-time researcher from May 2018 – December 2019

- Matthaios Tsangaris (Biochemistry), Honours Project in BCH4040, then part-time, May 2018 – December 2019
- Guillaume Roballo (Brazil, Military Engineering Institute) exchange Electrical Engineering student
- Marie-Pier Laberge (Biomed Eng.) fulltime coop Sept 2019 – December 2019
- Dmytro Lomovtsev (Biomed Eng.) COOP, then USRA, then part-time Sept. 2018 – Dec 2019
- Ahmed Rezk (Physics), Honours project 2020, January 2020 – April 2020
- Lucas Philipp (UBC Physics – fulltime coop), May 2019 – April 2020

CURRENT (10 HQPs)

Names of Current Graduate Students (6):

- Zachary Roelen (Ph.D.), Fabrication of Nanofluidic Transistors by Controlled Breakdown, September 2014 – present.
- Martin Charron (Ph.D.), Capture of DNA fragments by Solid-state Nanopores, September 2016 – present. [did MSc from 2016-2019]
- Liqun He (Ph.D.), Translocation of DNA origami structures through Nanopores, May 2018 – present.
- Philipp Karau (Ph.D.), Decoding Digital Information Stored on Molecules, January 2021 – present.
- Simon King (MSc.), Counting of NA fragments for infectious disease diagnostics, January 2019 – submitting in September 2021.
- Dmytro Lomovtsev (M.A.Sc. Mechanical Engineering, co-supervised with Prof. St-Gelais), Instrumentation for Temperature Controlled Nanopore Sensing January 2020 – present

Names of Current Postdocs, Lab Manager (3):

- Matthew Waugh, MSc (Physics/Biochemistry) May 2015 – present
- Kyle Briggs, PhD (Physics), November 2018 – present
- Erin McConnell, PhD (Chemistry), November 2020 -present

Names of Current Undergraduate Students (1):

- Yassine Bouhamidi (uOttawa, EE) part-time January 2021 – April 2021; Full-time May-August 2021; part-time September 2021- present

EXTERNAL RESEARCH FUNDING (Completed):

<u>Year</u>	<u>Source</u>	<u>Type*</u>	<u>Amount per year</u>	<u>Purpose</u>
2011	Canadian Foundation for Innovation PI: Tabard-Cossa, V.	F	\$160,871	Equipment
2011	Ontario Ministry of Research and Innovation PI: Tabard-Cossa, V.	G	\$160,871	Equipment
2011	NSERC – RTI PI: Tabard-Cossa, V.	C	\$137,643	Equipment
2011	NSERC – Discovery (5-years) PI: Tabard-Cossa, V.	C	\$20,000 (x5)	Salary Materials

2012	Ontario Network of Excellence – I-PoP (1-year) PI: Tabard-Cossa, V.	O	\$10,000	Salary Materials
2013	Ontario Network of Excellence – I-PoP (1-year) PI: Tabard-Cossa, V.	O	\$10,000	Salary Materials
2013	NSERC – CRD (3-years) with Abbott Laboratories PI: Tabard-Cossa, V.	C	\$116,833 (x3)	Salary Materials
2014	Ontario Center of Excellence with Abbott Laboratories Medical Science PoP (1-year) PI: Tabard-Cossa, V.	O	\$62,500	Salary Materials
2015	NSERC – RTI PI: Leslie, S. (McGill)	C	\$150,000	Equipment
2015	Abbott Laboratories Sponsored Research (3-years) PI: Tabard-Cossa, V.	O	US\$221,667 (x3)	Salary Equipment Materials
2015	Ontario Centres of Excellence Voucher for Innovation and Productivity II (2-years) with Abbott Laboratories PI: Tabard-Cossa, V.	O	\$125,000 (x2)	Salary Materials
2016	NSERC – CRD (2-years) with Abbott Laboratories PI: Tabard-Cossa, V.	C	\$233,970 (x2)	Salary Materials
2016	NSERC – Discovery (5-years) PI: Tabard-Cossa, V.	C	\$41,000 (x5)	Salary Materials
2016	Ontario Ministry of Research and Innovation (5-years) Early Researcher Award PI: Tabard-Cossa, V.	G	\$30,000 (x5)	Salary Materials
2016	Genome Canada – Disruptive Innovation in Genomics (2-years) PI: Tabard-Cossa, V.	O	\$125,000 (x2)	Salary Materials
2016	NSERC i2i Phase IIb (2-years) with Abbott Laboratories – PI: Tabard-Cossa, V.	C	\$350,000 (x2)	Salary Materials
2017	National Institute of Health (NIH) R21 (2-years) (US\$125/year) PI: McGrath, J. (University of Rochester)	O	\$86,500 (x2)	Salary Materials

EXTERNAL RESEARCH FUNDING (Active):

<u>Year</u>	<u>Source</u>	<u>Type*</u>	<u>Amount per year</u>	<u>Purpose</u>
2018	Ontario Centres of Excellence Voucher for Innovation and Productivity II (2-years) with Abbott Laboratories PI: Tabard-Cossa, V.	O	\$75,000 (x2)	Salary Materials
2019	NSERC – CRD (3-years) with Abbott Laboratories PI: Tabard-Cossa, V.	C	\$578,903 (x3)	Salary Materials
2020	Consulat Général de France Mourou-Strickland Mobility Program PI: Tabard-Cossa, V.	G	\$2,000	Travel
2020	NSERC-Alliance with Abbott Laboratories PI: Tabard-Cossa, V.	C	\$50,000	Salary Materials
2021	Government of Canada New Frontiers in Research Funds Exploration (2-years) (\$125,000/year) PI: Tabard-Cossa, V.	G	\$65,000 (x2)	Salary Materials
2021	National Institute of Health (NIH) R01 (4-years) (474,928/year) PI: McGrath, J. (University of Rochester)	O	US\$95,000 (x4)	Salary Materials
2021	NSERC – Discovery (5-years) PI: Tabard-Cossa, V.	C	\$61,000 (x5)	Salary Materials

*Type: C-Granting councils; G-Government; F-Foundations; O-Other

Note: I obtained a total amount of funding ~\$9,366,000 since 09/2010 (>\$5M of operating funds since being promoted to Associate Professor in 2015, all as sole or Principal Investigator, and ~\$3M as a co-PI).

INTERNAL RESEARCH FUNDING:

2010 [Completed]	Start-up Funds uOttawa PI: Tabard-Cossa, V.		\$115,000	Equipment Materials
2011 [Completed]	uOttawa and CFI (Core Facility in Biophysics, Biosensing and Biomaterials) PI: Pelling A.		\$90,000	Materials

2018 [Completed]	Ottawa Hospital (Department of Medicine, feasibility project) PI: Freedman M.		\$23,700	Materials
2019	Children Hospital of Eastern Ontario (CHEO) (Research Growth Awards) PI: Slinger R.		\$29,791	Materials
2021	Ottawa Hospital Research Institute (OHRI) (Excellerator Program) PI: Freedman M.		\$50,000	Materials

RESEARCH FUNDING APPLIED For:

2021	Canadian Foundation for Innovation PI: Tabard-Cossa, V.	F	\$155,514	Equipment
2021	Ontario Ministry of Research and Innovation PI: Tabard-Cossa, V.	G	\$155,514	Equipment

PUBLICATIONS:

1) Life-time summary:	
- Papers in <u>refereed</u> journal.....	48
- Papers in <u>refereed</u> conference proceedings	2
- Book Chapters	1
- Patents	7
2) Details for past 7 years (since promotion to Associate Professor):	
- Papers in <u>refereed</u> journal.....	26
- Book Chapters	0
- Patents	4

Note: I received a total of >5,300 citations (454 in 2018, 504 in 2019, 521 in 2020, 376 in 2021 so far)
Since 2015, I received > 3,200 citations – source: Google Scholar

Manuscripts Submitted (before September 1st, 2021) - (HQPs underlined):

[iv] Carlsen, A.; Tabard Cossa, V. "Mapping shifts in nanopore signal to changes in protein and protein-DNA conformation", major revisions at Proteomics, available as a preprint on BioRxiv (2021): <https://doi.org/10.1101/2020.04.01.020420>, 1 citation (not-self).

[iii] Charron, M.; Philipp, L.; He L.; Tabard-Cossa, V. “*Elucidating the Dynamics of Polymer Transport through Nanopores using Asymmetric Salt Concentrations.*” Under review at ACS Nano, available as a preprint ChemRxiv (2021): <https://doi.org/10.33774/chemrxiv-2021-8wm8v>

[ii] King, S.; Briggs, K.; Slinger, R.; Tabard-Cossa, V. “*Screening for Group A Streptococcal disease via Solid-State Nanopore Detection of PCR Amplicons.*” Submitted to ACS Sensors, available as a preprint on ChemRxiv (2021): <https://doi.org/10.33774/chemrxiv-2021-xhqf4>

[i] Briggs, K.; Bouhamidi, M.Y.; He, L.; Tabard-Cossa, V. “*Efficient simulation of arbitrary multi-component first-order binding kinetics for improved assay design and molecular assembly*”. Submitted to ACS Measurement Science Au, available as a preprint on ChemRxiv (2021): <https://doi.org/10.33774/chemrxiv-2021-7v78j> ; webapp at: <http://immunoassay.herokuapp.com>

Non-Refereed Publications & Book Chapters

[2] Ying, YL; Ivanov, A.P.; Tabard-Cossa, V. “*No small matter*”, Nature Chemistry 13, 216–217 (2021). [Invited meeting report]

[1] Tabard-Cossa, V. “*Engineered Nanopores for Bioanalytical Applications - Chapter 3: Instrumentation for Low-Noise High-Bandwidth Nanopore Recording*” pages 59-88 editors: Edel, J. B. and Albrecht, T.; Elsevier (2013)

Refereed Publications (HQPs underlined):

[50] He, L; Tessier, D; Briggs, K; Tsangaris, M; Charron, M; Lomovtsev, D; McConnell, E; Tabard-Cossa, V. “*Digital Immunoassay for Biomarker Concentration Quantification using Solid-State Nanopores*” In Press at Nature Communications (2021) <https://doi.org/10.1038/s41467-021-25566-8> (to be published on 09/09/2021).

[49] Chelsea Leung, Kyle Briggs, Marie-Pier Laberge, Smile Peng, Matthew Waugh, and Vincent Tabard-Cossa “*Mechanisms of solid-state nanopore enlargement under electrical stress*” Nanotechnology 31(44) (2020) – 1 citation.

[48] Thebault S, Abdoli M, Fereshtehnejad SM, Tessier D, Tabard-Cossa V, Freedman MS. “*Serum neurofilament light chain predicts long term clinical outcomes in multiple sclerosis.*” Scientific Reports 10(1): 1-11 (2020) – 18 citations.

[47] Eric Beamish, Vincent Tabard-Cossa and Michel Godin. “*Digital Counting of Nucleic Acid Targets using Solid-State Nanopores.*” Nanoscale 12(34): 17833-17840 (2020) – 1 citation.

[46] Sohi A, Beamish E, Tabard-Cossa V, Godin M. “*DNA Capture by Nanopore Sensors under Flow.*” Analytical Chemistry. 92(12): 8108-8116. (2020) – 5 citations.

[45] Thebault S, Lee H, Tessier D, Bose G Bowman M, Bar-Or A, Arnold D, Atkins H, Tabard-Cossa V. Freedman MS. “*Neurotoxicity after haematopoietic stem cell transplant for multiple sclerosis*”. Annals of Clinical and Translational Neurology 7(5): 767-775 (2020) – 6 citations.

[44] Waugh, M.; Briggs, K.; Gunn, D.; Gibeault, M.; King, S.; Ingram, Q.; Jimenez, A. M.; Berryman, S.; Lomovtsev, D.; Pregliasco, G.; Andrzejewski, L.; Tabard-Cossa, V. “*Solid-State Nanopore Fabrication by Automated Controlled Breakdown*” Nature Protocols 15, 122–143 (2020) – **received media coverage:** <https://www.altmetric.com/details/72800793>, and an **animated video** explaining the results was produced: <https://media.uottawa.ca/news/uottawa-tool-democratize-nanopore-research> **40 citations.**

[43] Michelle H Lam, Kyle Briggs, Konstantinos Kastritis, Martin Magill, Gregory R Madejski, James L McGrath, Hendrick W de Haan, Vincent Tabard-Cossa. “*Entropic Trapping of DNA with a Nanofiltered Nanopore.*” ACS Applied Nano Materials. 23(8): 4773-4781 (2019) – 15 citations.

[42] Liqun He, Philipp Karau, Vincent Tabard-Cossa “Fast capture and multiplexed detection of short multi-arm DNA stars in solid-state nanopores.” *Nanoscale*. 11(35): 16342-16350 (2019) – 11 citations.

[41] Eric Beamish, Vincent Tabard-Cossa, Michel Godin. “Programmable DNA Nanoswitch Sensing with Solid-State Nanopores”. *ACS Sensors*. 4(9): 2458-2464 (2019) – 8 citations.

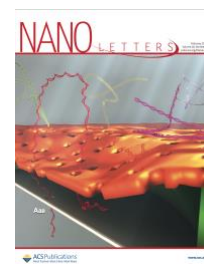
[40] Martin Charron, Kyle Briggs, Simon King, Matthew Waugh, Vincent Tabard-Cossa “Precise DNA Concentration Measurements with Nanopores by Controlled Counting”. *Analytical Chemistry*. 91(19): 12228-12237 (2019) – 16 citations.

[39] Madejski, G. R., Briggs, K., DesOrmeaux, J.-P., Miller, J. J., Roussie, J. A., Tabard-Cossa, V., McGrath, J. L., “Monolithic Fabrication of NPN/SiNx Dual Membrane Cavity for Nanopore-Based DNA Sensing” *Adv. Mater. Interfaces* 1900684, (2019) – 7 citations.

[38] Simon Thebault, Daniel Tessier, Hyunwoo Lee, Marjorie Bowman, Amit Bar-Or, Douglas Arnold, Harold Atkins, Vincent Tabard-Cossa, and Mark S Freedman “High Serum Neurofilament Light Chain normalises after Haematopoietic Stem Cell Transplant for MS” *Neurology: Neuroimmunology & Neuroinflammation* 6, 5, e598 (2019) – 21 citations.

[37] Karau, P.; Tabard-Cossa, V.; “Capture and Translocation Characteristics of Short Branched DNA Labels through Solid-State Nanopores” *ACS Sensor* 3, 7, 1308-1315 (2018) – 18 citations.

[36] Briggs, K.; Madejski, G.; Magill, M.; Kastritis, K.; de Haan, H.W.; McGrath, J.L.; Tabard-Cossa, V.; “DNA Translocations Through Nanopores Under Nanoscale Pre-Confinement” *Nano Letters* 18, 2, 660-668 (2018) – **Featured on the cover of the February 2018 issue and received significant media coverage (<https://acs.altmetric.com/details/30126833#score>) in particular from Materials Today.** A video, describing the operation of the nanofiltered nanopore device, is available at: <http://tcossalab.net/wp-content/uploads/Nanomembrane-Pre-filter-Explained.mp4> - **48 citations**



[35] Roelen, R.; Bustamante, A. J.; Carlsen, A.; Baker-Murray, A.; Tabard-Cossa, V.; “Instrumentation for Low Noise Nanopore-based Ionic Current Recording under Laser Illumination” *Review of Scientific Instruments*, 89, 015007 (2018) – 15 citations.

[34] Beamish, E.; Tabard-Cossa, V.; Godin, M.; “Identifying Structure in short DNA scaffolds using solid-state nanopores” *ACS Sensors* 2 (12) 1814-1820 (2017) – 26 citations.

[33] Tabard-Cossa, V.; Briggs, K.; Carlsen, A.; Charron, M.; Karau, P.; Roelen, Z.; Waugh, M “Nanopores: electronic tools for single-molecule biophysics and bio-nanotechnologies” **invited featured article** in special issue on Nanoscale Approaches to Biological Systems in *Physics in Canada* 73(2) (2017)

[32] Carlsen, A. T.; Briggs, K.; Hall, A. R.; Tabard-Cossa, V. “Solid-state nanopore localization by controlled breakdown of selectively thinned membranes” *Nanotechnology* 28 085304 (2017) – **selected to be part of the annual Highlights of 2017**, showcasing some of the best research of 2017 published in *Nanotechnology* – **41 citations**

[31] Tahvildari, R.; Beamish, E.; Briggs, K.; Chagnon-Lessard, S.; Najafi Sohi, A.; Han, S.; Watts, B.; Tabard-Cossa, V.; Godin, M. “Manipulating Electrical and Fluidic Access in Integrated Nanopore-Microfluidic Arrays Using Microvalves” *Small* 13, 1602601 (2017) – **Selected as a Frontpiece** – 26 citations.



- [30] Forstater, J.H.; Briggs, K.; Robertson, J.WF.; Etedgui, J.; Marie-Rose, O.; Vaz, C.; Kasianowicz, J.J.; Tabard-Cossa, V.; Balijepalli, A. “MOSAIC: A Modular Single Molecule Analysis Interface for Decoding Multi-state Nanopore Data” *Analytical Chemistry* 88(23), 11900-11907 (2016) – **62 citations**
- [29] Emaminejad, S.; Paik, K.; Tabard-Cossa, V.; Javanmard, M. “Portable cytometry using microscale electronic sensing” *Sensors and Actuators B: Chemical* 224, 275-281 (2016) – 18 citations.
- [28] Morin, TJ; Shropshire, T.; Liu, X.; Briggs, K.; Huynh, C.; Tabard-Cossa, V.; Wang, H.; Dunbar, WB. “Nanopore-Based Target Sequence Detection” *PLoS ONE*. 11(5):e0154426 (2016) – 38 citations.
- [27] Waugh, M.; Carlsen, A.; Sean, D.; Slater, G.; Briggs, K.; Kwok, H.; and Tabard-Cossa, V. “Interfacing Solid-State Nanopores with Gel Media to Slow DNA Translocations”. *Electrophoresis* 36: 1759–1767 (2015) doi: 10.1002/elps.201400488 – 34 citations.
- [26] Tahvildari, R.; Beamish, E.; Tabard-Cossa, V.; and Godin, M.; “Integrating nanopore sensors within microfluidic channel arrays using controlled breakdown” – *Lab Chip* 15, 1407-1411 (2015) – **66 citations**
- [25] Briggs, K.; Charron, M.; Kwok, H.; Le T.; Chahal, S.; Bustamante, J.; Waugh, M.; and Tabard-Cossa, V. “Kinetics of Nanopore Fabrication by Controlled Breakdown of Dielectric Membranes in Solution”. *Nanotechnology* 26 084004 (2015) – **79 citations**
- [24] Kwok, H.; Waugh, M.; Bustamante, J.; Briggs and Tabard-Cossa, V.; “Long Passage Times of Short ssDNA Molecules through Metallized Nanopores Fabricated by Dielectric Breakdown” – *Advanced Functional Materials*, 24: 7745-7753 (2014) – 29 citations.
- [23] Briggs, K.; Kwok, H.; and Tabard-Cossa, V.; “Automated Fabrication of 2-nm solid-state nanopore for nucleic acid analysis” – *Small* doi: 10.1002/smll.201303602 (2014) **Media coverage: featured in Sequence Genomeweb and Materials Views news article – 128 citations**
- [22] Kwok, H.; Briggs, K.; and Tabard-Cossa, V.; “Nanopore Fabrication by Controlled Dielectric Breakdown” – *PLoS ONE* 9(3): e92880. doi: 10.1371/journal.pone.0092880 (2014) – **297 citations**
- [21] Beamish, E.; Kwok, H.; Tabard-Cossa, V.; and Godin, M.; “Fine-Tuning the Size and Minimizing the Noise of Solid-State Nanopores” – *JOVE - J. Vis. Exp.* (80), e51081, doi:10.3791/51081 (2013) – 23 citations.
- [20] Beamish, E.; Kwok, K.; Tabard-Cossa, V.; and Godin, M.; “Precise control of the size and noise of solid-state nanopores using high electric fields” - *Nanotechnology* 23, 405301 (2012) – **90 citations**
- [19] Paik, K. H.; Liu, Y.; Tabard-Cossa, V.; Waugh, M. J.; Huber, D. E.; Provine, J; Howe, R. T.; Dutton, R. W.; and Davis, R. W., “Control of DNA Capture by Nanofluidic Transistors” *ACS Nano* 6, 6767–6775 (2012) – **78 citations**
- [18] Jetha N. N., Feehan C., Wiggin M., Tabard-Cossa V., Marziali A., “Long dwell time passage of DNA through nanometer-scale pores: Kinetics and sequence dependence of motion” *Biophysical Journal* 100, 12, 2974-2980 (2011) – 12 citations.
- [17] Paik, K. H.; Liu, Y.; Tabard-Cossa, V.; Huber, D. E.; Provine, J.; Howe, R. T.; Dutton, R. W.; Davis, R. W. “Experimental Demonstration and Analysis of DNA Passage in Nanopore-based Nanofluidic Transistors” *Conference Proceedings of the IEEE International Electron Devices Meeting (IEDM), Washington, USA* (2011)
- [16] Paik, K. H.; Liu, Y.; Tabard-Cossa, V.; Huber, D. E.; Provine, J.; Howe, R. T.; Dutton, R. W.; Davis, R. W. “Efficient Control of DNA Motion and Translocation in Nanopore-based Nanofluidic Transistors” *Conference Proceeding at the 15th Int. Conf. on Miniaturized Systems for Chemistry and Life Sciences (μTAS 2011)*

Seattle, USA, (2011)

[15] Liu Y., Huber D., Tabard-Cossa V., Dutton R. W., “*Descreening of field effect in electrically gated nanopores*” Applied Physics Letters 97, 143109, 3 pages, (2010) – **44 citations**

[14] Godin M.*, Tabard-Cossa V.*, Miyahara Y., Monga T., Williams P J, Beaulieu L Y, Lennox R B., Grütter P., “*Cantilever-Based Sensing: Origin of the Surface Stress and Optimization Strategies*” Nanotechnology 21, 075501, 8 pages, (2010) *These authors contributed equally to this work – **160 citations**

[13] Tabard-Cossa V., Wiggin M., Trivedi D., Jetha N. N., Dwyer J. R., Marziali A., “*Single-Molecule Bonds Characterized by Solid-State Nanopore Force Spectroscopy*” ACS Nano 3 (10), 3009-3014 (2009) - **83 citations**

[12] Branton D., Deamer D. W., Marziali A., Bayley H., Benner S. A., Butler T., Di Ventra M., Garaj S., Hibbs A., Huang X., Jovanovich S. B., Krstic P. S., Lindsay S., Ling X. S., Mastrangelo C. H., Meller A., Oliver J. S., Pershin Y. V., Ramsey J. M., Riehn R., Soni G. V., Tabard-Cossa V., Wanunu M., Wiggin M. & Schloss J. A.; “*The potential and challenges of nanopore sequencing*” Nature Biotechnology 26, 1146-1153 (2008) - **2638 citations**

[11] Wiggin M.; Tropini C.; Tabard-Cossa V.; and Marziali A.; “*Non-exponential kinetics of DNA escape from alpha-Hemolysin nanopores*” Biophysical Journal 95, 5317–5323 (2008) - **59 citations**

[10] Tabard-Cossa, V.; Godin, M.; Burgess, I.; Monga, T.; Lennox, R. B.; Grütter, P.; “*Microcantilever-based Sensors: Effect of Morphology, Adhesion and Cleanliness of the Sensing Substrate on Surface Stress*” Analytical Chemistry 79, 8136 -8143, (2007) - **81 citations**

[9] Tabard-Cossa, V.; Trivedi, D.; Wiggin, M.; Jetha, N.; Marziali, A.; “*Noise Analysis and Reduction in Solid-State Nanopores*” Nanotechnology 18, 305505 (2007) - **307 citations**

[8] Beaulieu L.Y.; Godin M.; Laroche O.; Tabard-Cossa V.; and Grütter P., “*A complete analysis of the laser beam deflection systems used in cantilever-based systems*” Ultramicroscopy 107, 422-430 (2007) – **60 citations.**

[7] Beaulieu, L.Y.; Godin, M.; Laroche, O.; Tabard-Cossa, V.; Grütter, P.; “*Calibrating Laser Beam Deflection Systems for use in Atomic Force Microscopes and Cantilever Sensors*” Applied Physics Letters 88, 083108 (2006) – 36 citations.

[6] Tabard-Cossa, V.; Godin, M.; Burgess, I.; Lennox, R. B.; Grütter, P.; “*Redox-induced Surface Stress of Polypyrrole-based actuators*” Journal of Physical Chemistry B 109 (37), 17531-17537 (2005) – **49 citations.**

[5] Tabard-Cossa, V.; Godin, M.; Beaulieu, L.Y.; Grütter, P.; “*A Differential Microcantilever-Based System for Measuring Surface Stress Changes Induced by Electrochemical Reactions*” Sensors and Actuators B 107, 233-241 (2005)– Erratum: Sensors and Actuators B 119, 352-354 (2006) – **82 citations**

[4] Godin, M.; Williams, P.J.; Tabard-Cossa, V.; Laroche, O.; Beaulieu, L.Y.; Lennox, R. B.; Grütter, P.; “*Surface Stress, Kinetics, and Structure of Alkanethiol Self-Assembled Monolayers*” Langmuir 20, 7090 (2004) – **Featured on the Langmuir journal cover - 226 citations**



[3] Quist, F.; Tabard-Cossa, V.; Badia, A. “*Nanomechanical Cantilever Motion Generated by a Surface-Confined Redox Reaction*” Journal of Physical Chemistry B 107, 10691-10695 (2003) – **49 citations.**

[2] Godin, M.; Laroche, O.; Tabard-Cossa, V.; Beaulieu, L.Y.; Grütter, P.; Williams, P.J.; “*Combined in situ Micromechanical Cantilever-Based Sensing and Ellipsometry*” Review of Scientific Instruments 74, 4902 (2003) – **50 citations.**

[1] Godin, M.; Tabard-Cossa, V.; Grütter, P.; Williams, P.; “*Quantitative Surface Stress Measurements using*

a Microcantilever” Applied Physics Letter 79, 551 (2001) - **130 citations**.

Intellectual Property (4 issued patents, 3 patent applications):

Note: All patents involve intellectual property developed at the University of Ottawa and have been licensed to two different companies. Patents #7-2 are being filed in 10 jurisdictions and covering 17 countries (over 60 patents have been granted so far).

[7] *“Improved Techniques for Nanopore Enlargement”* inventors: Matthew Waugh, Kyle Briggs, Vincent Tabard-Cossa. United States Patent Application. 63/042,637. June 23 2020. Patent Pending **Licensed**

[6] *“Controlling Translocating Molecules Through a Nanopore”* PCT/US18/29939 Inventors: Kyle Briggs, Vincent Tabard-Cossa, Gregory Madejski, James McGrath. Priority date: April 28, 2017. Patent Pending **Licensed**

[5] *“Localizing Nanopore Fabrication on a Membrane by Laser Illumination during Controlled Breakdown”* Publication number: WO2016135656A1 Application number: PCT/IB2016/051017 Inventors: Jose Bustamante, Kyle Briggs, Vincent Tabard-Cossa. Priority date: Feb 24, 2015. Patent Pending **Licensed**

[4] *“Nanopore Fabrication within Microfluidic Channels”*. PCT/IB2015/059799. Inventors: Radin Tahvildari, Eric Beamish, Michel Godin, Vincent Tabard-Cossa. Priority date: Dec 19, 2014. **Issued and Licensed**

[3] *“Fabrication of nanopores using high electric fields”*. Publication number: WO2013167955 A1. Application number: PCT/IB2013/000891. Inventors: Harold Kwok, Vincent Tabard-Cossa, Kyle Briggs. Priority date: May 7, 2012. **Issued and Licensed**

[2] *“Method for controlling the size of solid-state nanopores”*. Publication number: WO2013167952 A1. Application number: PCT/IB2013/000884. Inventors: Michel Godin, Eric Beamish, Vincent Tabard-Cossa, Harold Kwok. Priority date: May 7, 2012. **Issued and Licensed**

[1] *“Flow control method and apparatuses”*. Publication number: US20140090981 A1. Application number: US 14/043,710. Inventors: Kee-Hyun Paik, Yang Liu, Vincent Tabard-Cossa, Robert W. Dutton. Priority date: Oct 1, 2012. **Issued and Licensed**

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