OUSSAMA ABDERRAHMANE DAMBRI

PhD | Electrical Engineering • Bio-Inspired Systems • Biomedical Technologies

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RESEARCH PROFILE

Interdisciplinary researcher with a PhD in electrical engineering and foundational training in biomedical electronics, medical instrumentation, and microbiology. Research spans molecular and wired nanocommunication, bio-inspired optoelectronic interfaces, biomedical sensing, optogenetics, and computational modelling. Recent collaborations extend into privacy-preserving AI architectures for health care and emerging machine-learning-assisted photonic design. Former postdoctoral researcher at the University of Ottawa; currently Programs Officer at the Canada Foundation for Innovation.

RESEARCH INTERESTS

Molecular and nanoscale communication systems • Bio-inspired biomedical devices • Neuronal signalling and optogenetics • Bioluminescent/optical interfaces • Biomedical sensing and instrumentation • Computational modelling and simulation • Privacy-preserving AI for health care

RESEARCH IMPACT

207 citations | h-index: 8 | i10-index: 7

Source: Google Scholar profile, 13 October 2026 (all-time metrics).

ACADEMIC AND PROFESSIONAL APPOINTMENTS

Programs Officer | Aug 2025–Present

Canada Foundation for Innovation (CFI), Ottawa, Canada

- Work at the intersection of research programs, peer-review operations, researcher expertise analysis, and AI-assisted research administration.
- Develop tools for scholarly-information integration and reviewer discovery using public publication metadata, persistent identifiers, and structured quality controls.

Postdoctoral Research Fellow | Jan 2021–Aug 2025

School of Electrical Engineering and Computer Science, University of Ottawa, Ottawa, Canada

- Participated in and coordinated multidisciplinary research spanning bio-inspired light emission, optical interfaces, neuronal stimulation, and biomedical nanosystems.
- Supported conceptual design, computational modelling, evaluation of system performance, research dissemination, proposal preparation, and student mentoring.

Research Auxiliary | Jan 2019–Dec 2020

Faculty of Engineering, Université de Sherbrooke, Sherbrooke, Canada

- Investigated design and performance of polymer-based wired nanocommunication systems, including the self-assembly and operation of nanoscale channels.

EDUCATION

PhD, Electrical Engineering | Université de Sherbrooke, Canada • 2017–2020

Thesis: “Design and Evaluation of New Methods to Enhance the Performance of Nano-Communication Networks.”

MEng, Biomedical Electronics | Université de Batna 2, Algeria • 2014–2016

Graduated with highest distinction (valedictorian); biosensors, optics, semiconductors, and numerical analysis.

BSc, Medical Instrumentation | Université de Batna 2, Algeria • 2011–2014

Ranked first in cohort (1/65); sensing technologies, signal processing, and medical instrumentation.

BSc, Microbiology | Université de Batna 2, Algeria • 2007–2011

Microbiology and biochemistry.

RESEARCH PROJECTS AND CONTRIBUTIONS

Bio-inspired optical and bioluminescent systems | University of Ottawa • 2021–2025
Investigation of light-emitting biological mechanisms for optical and optogenetic applications, including modelling aequorin-based emitters and concepts for optically interfaced biomedical devices.

Bio-Neural Dust: neural stimulation interface | University of Ottawa • 2021–2025
Multidisciplinary design work on an optical neural-stimulation interface; involved simulation-oriented research and mentoring related to optogenetic neuron stimulation.

Wired and polymer-based nanocommunication | Université de Sherbrooke • 2017–2020
Developed and evaluated receiver/channel approaches for nanoscale wired transmission; studied polymer-based and self-assembled communication structures.

Diffusion-based molecular communication | Université de Sherbrooke • 2017–2020
Researched receiver design and performance enhancement in molecular networks, including methods to address signal distortion and intersymbol interference.

Bio-inspired nanogenerators for biomedical devices | University of Ottawa • Collaborative research
Contributed to modelling and simulation studies of bio-inspired nanogenerator behaviour in medical application scenarios.

PEER-REVIEWED JOURNAL ARTICLES

1. Shahsavari, Y., Baseri, Y., Hafid, A., **Dambri, O. A.**, & Makrakis, D. (2026). “Integration of Federated Learning and Blockchain in Health Care: Tutorial on Medical Data, Architectures, Privacy, Security, and Regulatory Compliance.” Journal of Medical Internet Research, 28, e80178. https://doi.org/10.2196/80178
2. Azarnoush, A., **Dambri, O. A.**, Karatop, E. Ü., Makrakis, D., & Hafid, A. S. (2025). “Design and Modeling of a Bio-Inspired Aequorin-Based Light-Emitting Unit: Applications in Optogenetics and Beyond.” IEEE Transactions on Biomedical Engineering, 72(10), 2925–2936. https://doi.org/10.1109/TBME.2025.3556793
3. **Dambri, O. A.**, Makrakis, D., & Hafid, A. S. (2024). “Neuronal Communication Systems.” IEEE Nanotechnology Magazine, 18(5), 14–21.
4. Makrakis, D., **Dambri, O. A.**, & Hafid, A. S. (2024). “Design of Bio-Optical Transceiver for In Vivo Biomedical Sensor Applications.” Sensors, 24, 2584.
5. **Dambri, O. A.**, Cherkaoui, S., & Makrakis, D. (2023). “Design and Evaluation of a Receiver for Wired Nano-Communication Networks.” IEEE Transactions on NanoBioscience, 22(2), 223–236.
6. Azarnoush, A., **Dambri, O. A.**, Eslin, U. K., Makrakis, D., & Cherkaoui, S. (2023). “Simulation and Performance Evaluation of a Bio-Inspired Nanogenerator for Medical Applications.” IEEE Transactions on Biomedical Engineering, 70(9), 2616–2623.
7. **Dambri, O. A.**, & Cherkaoui, S. (2022). “Modeling Self-Assembly of Polymer-Based Wired Nano-Communication Channel.” IEEE Transactions on Molecular, Biological and Multi-Scale Communications, 8(2), 107–118.
8. **Dambri, O. A.**, & Cherkaoui, S. (2020). “Performance Enhancement of Diffusion-Based Molecular Communication.” IEEE Transactions on NanoBioscience, 19(1), 48–58.

SUBMITTED MANUSCRIPTS

• “Plasmonic Nanoparticle Optical Filter Design Using a Machine Learning Approach.” Submitted to Journal of Optics. (Co-authored manuscript.)

• “Quantum Dot Enhanced Bioluminescent Emitter for Optogenetic Stimulation.” Submitted to IEEE Transactions on NanoBioscience. (Co-authored manuscript.)

PEER-REVIEWED CONFERENCE PAPERS

1. **Dambri, O. A.**, & Cherkaoui, S. (2019). “Toward a Wired Ad Hoc Nanonetwork.” IEEE International Conference on Communications (ICC), Dublin, Ireland.

2. Abouaomar, A., Cherkaoui, S., Kobbane, A., & **Dambri, O. A.** (2019). “A Resources Representation for Resource Allocation in Fog Computing Networks.” IEEE Global Communications Conference (GLOBECOM), Waikoloa, HI, USA.
3. **Dambri, O. A.**, Abouaomar, A., & Cherkaoui, S. (2019). “Design Optimization of a MIMO Receiver for Diffusion-based Molecular Communication.” IEEE Wireless Communications and Networking Conference (WCNC), Marrakesh, Morocco.
4. **Dambri, O. A.**, Cherkaoui, S., & Chakraborty, B. (2019). “Design and Evaluation of Self-Assembled Actin-Based Nano-Communication.” International Wireless Communications and Mobile Computing Conference (IWCMC), Tangier, Morocco.
5. **Dambri, O. A.**, & Cherkaoui, S. (2018). “Enhancing Signal Strength and ISI Avoidance of Diffusion-based Molecular Communication.” International Wireless Communications and Mobile Computing Conference (IWCMC), Limassol, Cyprus.

TEACHING AND MENTORSHIP

Research mentor | Bio-Communications Research Laboratory, University of Ottawa • Sep 2022–Apr 2023
Developed undergraduate research tasks and advised simulation-oriented work related to Bio-Neural Dust and optogenetic stimulation.

Guest lecturer | Algonquin College, School of Advanced Technology • 2023
Medical Imaging and Biosensors (PLT4004); guest lecture on the development and prospects of biomedical imaging and sensing.

Teaching assistant | Université de Sherbrooke • 2017–2019
Courses included programmable logic and interfaces; multiplexing and switching; communication networks and protocols; operating systems.

Teacher, natural and life sciences | Dar El-Ilm private school, Batna, Algeria • Nov 2015–Mar 2017
Secondary-level instruction.

ACADEMIC SERVICE

Journal peer reviewer: IEEE Transactions on Molecular, Biological and Multi-Scale Communications; IEEE Transactions on Biomedical Engineering; IEEE Transactions on NanoBioscience; IEEE Communications Magazine; IEEE Communications Letters; Nano Communication Networks; Sensors.

Conference technical program committee service: IEEE ICC (2019), GLOBECOM (2019), WCNC (2019), and IWCMC (2018–2019).

Thesis reviewing: PhD dissertation, “Molecular Communication in the Human Body for Implanted Electronic Medical Devices,” University of Toronto (2021).

HONOURS AND SCHOLARSHIPS

Québec government PhD tuition waiver (2017–2020) • EUREKA scholarship, Université de Sherbrooke (2019–2020) • Excellent Student Award, Université de Batna 2 (2015–2016).

TECHNICAL SKILLS

Scientific programming and modelling: Python, MATLAB, C/C++, SQL, Bash; NumPy, pandas; COMSOL, nanoNS3, AcCoRD, NEURON.

Data and research tools: Power BI, Tableau, MySQL, Azure, GitHub; OpenAlex and ORCID metadata; scholarly-information workflows; Microsoft Power Automate and Copilot Studio.

SELECTED TRAINING AND CERTIFICATES

Duke University / Coursera courses in Python and pandas for data engineering; Linux and Bash; Python and SQL scripting; web applications and command-line tools for data engineering.

LANGUAGES

Arabic — native | English — fluent | French — fluent | Italian — intermediate