

Dr. Serge Nader

STRUCTURAL BIOLOGIST · AEROSOLS AND THE ORIGINS OF LIFE

Edmonton, Alberta, Canada - Open to relocate within Europe or Canada.

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Research Experience

Postdoctoral fellowship

University of Alberta, Gunning-Lemieux Chemistry Centre, Mansy Group

Edmonton, Canada

Oct. 2019 - Oct. 2023

Research Activities:

- Conducted research on aerosols, proto-cells and proto-metabolism to gain insight on the origins of life.
- Designed and built experimental setups for the generation and handling of aerosols.
- Studied interactions between liquid media and aqueous aerosols with a focus on aerosol to vesicle transformation.
- Synthesized peptides and carried out experiments under anaerobic conditions.
- Developed Fit-FeS, a spectral decomposition tool for UV-Vis spectra to analyze iron-sulfur clusters in peptides or proteins.
- Supervised and co-authored research publications with postdoctoral fellows and undergraduate, graduate and visiting students.

Laboratory Management and Administration:

- Led the set up of a new research laboratory upon the arrival of Prof. Mansy to the University of Alberta.
- Coordinated laboratory logistics and the procurement of equipment and supplies.
- Was in charge of competitive bid procedures, instrument purchase, installation and user training.
- Assembled AtmosBags, optimized Schlenk lines and installed an inert atmosphere glovebox system.
- Formalized laboratory safety and waste management. Wrote Standard Operating Procedures (SOPs).
- Designed and 3D-printed laboratory accessories to streamline workflow.

Doctoral thesis

French Atomic Energy Commission & National Centre for Scientific Research

Grenoble, France

Oct. 2015 - Nov. 2018

- Purified and carried out structural studies (MALLS, XAFS, SAXS) and crystallization of Fur proteins.
- Used molecular dynamics simulations and developed in house scripts to identify critical Fur amino acids.
- Proposed mechanistic models based on a coupled theoretical and experimental approach.

Master of Science thesis

Université Paris Descartes & Université Saint-Joseph de Beyrouth

Lebanon & France

Feb. 2014 - Jun. 2015

- Laboratory of Pharmaceutical and Toxicological Chemistry and Biochemistry: performed interaction studies between a zinc metallo- β -lactamase and an inhibitor using SIBFA, a polarizable force field.
- Laboratory of Structures and Interactions of Macromolecules: identified monoclonal antibodies recognition sites on the HIV-1 integrase using spectroscopic techniques.

Education

Ph.D. in Structural Biology

Université Grenoble Alpes, Chemistry and Biology of Metals laboratory (LCBM)

Grenoble, France

2015 - 2018

M.Sc. in Structures of Macromolecules and Functional Genomics

Université Saint-Joseph de Beyrouth, Faculty of Sciences

Mar Roukoz, Lebanon

2013 - 2015

B.Sc. in Life and Earth Sciences - Biochemistry

Université Saint-Joseph de Beyrouth, Faculty of Sciences

Mar Roukoz, Lebanon

2010 - 2013

Grants and Awards

Campus Sustainability Major Grant

Holder of the Faculty of Science project "Sustainable procurement of laboratory accessories through 3D-printing". Awarded **\$48,000** by the Energy & Climate Action office.

University of Alberta

Jun. 2023

Campus Sustainability Leaders Award

Awarded by the University of Alberta Sustainability Council, [read the article](#).

University of Alberta

Apr. 2023

Teaching Experience

Academic years 2016-2017 & 2017-2018

Grenoble, France

Faculty of Pharmacy of Grenoble

128 hours

Taught laboratory courses for groups of 20 students for the M.Sc. "Drug Sciences and Health Engineering" at the Faculty of Pharmacy of Grenoble. Wrote examination questions and evaluated student exams, laboratory notebooks and oral presentations. Laboratory courses included the production of mutant and wild-type DNA sequences, bacterial transformation, protein production and purification, and activity assays.

Skills

Aerosols	Expertise in aerosol generation and handling. Familiar with optical particle counters, custom and commercial nebulizers, microfluidics pressure regulators and gas mass flow controllers. Design of glassware for scientific glassblowing and de novo experimental apparatus.
Vesicles and Peptides	Liposome and vesicle preparation. Fluorescence assays. Peptide synthesis. Anaerobic experiments. Epifluorescence, confocal and transmission electron microscopy. LC-MS and UV-Vis spectrophotometry.
Structural Biology	Protein expression, purification and crystallization. Molecular Dynamics & Docking. Synchrotron beam-lines: XAFS and SAXS.
Programming	AWK, \LaTeX , Python, Shell, Visual Basic for Applications (VBA), Linux/Unix environment.
3D-design	Autodesk Fusion 360, Cura, Microsoft 3D Builder, UltiMaker and Prusa ecosystems.
Languages	Arabic (native), French (fluent), English (fluent), Italian (novice).

Service to the community

3D-Printing Service

Edmonton, Canada

University of Alberta, Department of Chemistry

Jun. 2023 - Oct. 2024

- Created and managed a 3D Printing Service focused on research and education.
- Employed part time assistants and acquired a high-end 3D-printer for the production of laboratory accessories.
- Assisted 35 research groups from 7 different departments and worked with 10 technical or research support services.
- Generated approximately **\$25,000** in financial savings for the University of Alberta.

Fossil preparation

Edmonton, Canada

University of Alberta, Dino Lab

Oct. 2022 - Apr. 2023

Prepared fossil specimens uncovered from Dinosaur Provincial Park (Alberta, Canada) and joined a local excavation field party. Featured in Volunteer Spotlights.

Bilingual judges - Team leader

Edmonton, Canada

Canada-Wide Science Fair | Expo-Sciences PanCanadienne

May. 2023

Assessed and scored science projects. Interviewed candidates in English or in French. Contributed to the judging panel of special awards programs.

Laboratory council member

Grenoble, France

Laboratoire de Chimie et Biologie des Métaux - CEA

Oct. 2015 - Sep. 2018

Represented non permanent staff, PhD students and postdoctoral fellows, during laboratory council meetings. Organized social and team building activities. Created and managed social media pages for the laboratory.

University board member

Beirut, Lebanon

Saint Joseph University of Beirut

Oct. 2013 - Jul. 2015

Represented the Science and Technology Campus during general assemblies and meetings of the Saint-Joseph University board. Proposed and conveyed solutions for problems faced by campus students.

Scientific Communications

Jun. 2024	Campus Sustainability Mixer (Invited Seminar)	Edmonton, Canada
Dec. 2023	Saint George University of Beirut (Invited Seminar)	Beirut, Lebanon
Nov. 2023	Laboratoire de Chimie et Biologie de Métaux (Invited Seminar)	Grenoble, France
Nov. 2023	Conférence nationale d'Exobiologie (Oral Communication)	Grenoble, France
Oct. 2023	Origins of Life Donostia Meeting (Poster)	Donostia, Spain
Nov. 2022	Space Exploration Symposium (Oral Communication)	Edmonton, Canada
Jun. 2022	Molecular Origins of Life & Emergence of Life Forum (Poster)	Munich, Germany
Sep. 2018	Scientific meeting of the "Academic Research Community 1-Santé" (Oral Communication)	Isle d'Abeau, France
Jul. 2018	43 rd Federation of European Biochemical Societies Congress (Poster)	Prague, Czech Republic

Publications

Nader, S. , Baccouche, A., Connolly, F., Abou-Ghanem, M., Styler, S.A., Lewis, J., Pink, D., Mansy, S.S., ACS Earth & Space Chemistry , 2022, "Model atmospheric aerosols convert to cell-sized vesicles upon entry into lipid coated aqueous solution". https://doi.org/10.1021/acsearthspacechem.2c00328	2023
Nader, S. , Sebastianelli, L., Mansy, S.S., Philosophical Transactions of the Royal Society A , 2022, "Protometabolism as out-of-equilibrium chemistry". https://royalsocietypublishing.org/doi/10.1098/rsta.2020.0423	2022
Valer, L., Rossetto, D., Scintilla, S., Hu, Y.J., Tomar, A., Nader, S. , Betinol, I.O., Mansy, S.S., Canadian Journal of Chemistry , 2022, "Methods to identify and characterize iron-sulfur oligopeptides in water". https://cdnsiencepub.com/doi/abs/10.1139/cjc-2021-0237	2022
Ha, M., Nader, S. , Pawsey, S., Struppe, J., Monette, M., Mansy, S.S., Boekhoven, J., Michaelis, V.K., The Journal of Physical Chemistry B , 2021, "Racing Towards Fast and Effective 17O Isotopic Labeling and NMR Spectroscopy of N-formyl-MLF-OH and Associated Building Blocks". https://pubs.acs.org/doi/10.1021/acs.jpcb.1c07397	2021
Betinol, I., Nader, S. , Mansy, S.S., Analytical Biochemistry , 2021, "Spectral decomposition of iron-sulfur clusters". https://doi.org/10.1016/j.ab.2021.114269 ; Fit-FeS : https://doi.org/10.5281/zenodo.4765989	2021
Basak, S., Nader, S. , Mansy, S.S., JACS Au , 2021, "Protometabolic Reduction of NAD ⁺ with α -Keto Acids". https://doi.org/10.1021/jacsau.0c00124	2021
Nader, S. , Pérard, J., Carpentier, P., Arnaud, L., Crouzy, S., Michaud-Soret, I., Biometals , 2019, "New insights into the tetrameric family of the Fur metalloregulators". https://doi.org/10.1007/s10534-019-00201-8	2019
Nader, S. , Université Grenoble Alpes , "Structural studies on inhibition mechanisms, oligomerization and DNA binding of the transcription regulator Fur : from <i>in silico</i> simulations to <i>in vitro</i> biological assays". https://tel.archives-ouvertes.fr/tel-02050234	2018
Pérard, J., Nader, S. , Levert, M., Arnaud, L., Carpentier, P., Siebert, C., Blanquet, F., Cavazza, C., Renesto, P., Schneider, D., Maurin, M., Coves, J., Crouzy, S., Michaud-Soret, I., Communications Biology , 2018, "Structural and functional studies of the metalloregulator Fur identify a promoter-binding mechanism and role in <i>Francisella tularensis</i> virulence". https://doi.org/10.1038/s42003-018-0095-6	2018
Kwapien, K., Damergi, M., Nader, S. , El Khoury, L., Hobaiika, Z., Maroun, R., Piquemal, J.P., Gavara, L., Berthomieu, D., Hernandez, J.F., Gresh, N., The journal of physical chemistry. B , 2017, "Calibration of 1,2,4-Triazole-3-Thione, an Original Zn-Binding Group of Metallo- β -Lactamase Inhibitors. Validation of a Polarizable MM/MD Potential by Quantum Chemistry". https://doi.org/10.1021/acs.jpcb.7b01053	2017

Additional Training and Certificates

2022	Naloxone training , University of Alberta.	<i>Edmonton, Canada</i>
2019	Transportation of Dangerous Goods , University of Alberta.	<i>Edmonton, Canada</i>
2019	Gender-Based Analysis+ , Government of Canada.	<i>Edmonton, Canada</i>
2017	Doctoriales ®, Université Grenoble Alpes. Financial predictions for an innovation project.	<i>Autrans, France</i>
2016	FAME+ 2016 , French National Centre for Scientific Research. X-ray absorption training for the control and management of an experiment using synchrotron beam-lines.	<i>Grenoble, France</i>

Professional affiliations and memberships

- European Astrobiology Network Association
- Origin of Life Early-career Network
- Société Française d'Exobiologie

Interests

Squash • Paragliding • Mountaineering • Time-lapse photography • 3D-printing • Fossil preparation