

Dr. Nestor J. Zaluzec

*Sr. Scientist and Electron Metrologist of Energy and Quantum Materials
Microscopy & Microanalysis Consulting
Quondamship - University of Chicago /Argonne National Laboratory
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Education

Ph.D., Metallurgy , University of Illinois, Urbana, Illinois (1978)
B.S., Physics, Illinois Institute of Technology, Chicago, Illinois (1973)

Professional Experience

University of Chicago - Pritzker School of Molecular Engineering (2024->2025)

Sr. Scientist: Electron Metrologist of Energy and Quantum Materials

Argonne National Laboratory

Senior Scientist: Microscopy (2005->2024)

Scientific Director & Group Leader : Electron Microscopy Center, (1984-1994)

Scientist: Electron Microscopy Center(1983-2005)

Assistant Scientist: Materials Science Division & Electron Microscopy Center (1979-1983)

Oak Ridge National Laboratory

J.P. Wigner Research Fellow, Oak Ridge National Laboratory, Oak Ridge Tn, (1978->present)

University Appointments

Senior Fellow Consortium for Advanced Science and Engineering:
University of Chicago (2018-> 2024)

Senior Fellow Northwestern Argonne Institute for Science and Engineering (2017->2024)

Senior Fellow Computational Institute: University of Chicago (2004-> 2018)

Visiting Professor Materials Characterization Center: Univ. of Manchester, UK (2013-> 2017)

Visiting Professor of Materials Science: Northern Illinois University (1999-> present)

Adjunct Professor of Physics: University of Illinois at Chicago (1997-> present)

Visiting Scientist Dept of Materials Science: Cambridge University, UK (1995-1997)

Adjunct Professor Dept of Metallurgy: University of Illinois – Urbana Champaign (1980-1997)

Adjunct Professor Dept of Metallurgy: Illinois Institute of Technology, Chicago (1980-1985)

Professional Honors and Awards

David Cockayne AMMS Award – (2023)

R&D 100 Finalist Award – *The ANL X-ray Perimeter Detector* (2022)

Microscopy-Today Innovations Award – (2022)

Guinness World Record – *XPAD – The Most Sensitive X-ray Detector* – (2022)

Duncumb Award for Excellence in Microanalysis – Microanalysis Society - (2020)

Honorary Lifetime Member – Australian Microscopy & Microanalysis Society – (2018)

Fellow of the MicroAnalysis Society (2018)

Distinguished Professional Achievement Award: Illinois Institute of Technology (2018)

Distinguish Scientist Award: Microscopy Society of America (2017)

Presidential Science Award: Microbeam Analysis Society (2012)

R&D 100 Award: The π Steradian X-ray Detector for Electron-Optical Beam Lines (2010)

President Microscopy Society of America (2010-2012)

Fellow of the Microscopy Society of America (2009)

Distinguished University Alumni Award University of Illinois, College of Engineering - (2005)

August Köhler Award: State Microscopical Society of Illinois (2004)

Distinguished Scientist Award : Australian Microscopy Society: (2004)

R&D 100 Award: Scanning Confocal Electron Microscope (2003)

Executive Council Member Microscopy Society of America (2002-2004)

M.D. Maser Distinguished Service Award: Microscopy Society of America: (1998)

Presidential Citation: Australian Society for Electron Microscopy (1996)

Honorary Lifetime Member Illinois Junior Academy of Science (1995)
 Member of the Year: Midwest Society of Electron Microscopists (1993)
 Distinguished Service Award EMSA Bulletin (1987)
 Science Digest: One of America's 100 Brightest Scientists (1984)
 E.F. Burton Award for Contributions to Electron Microscopy (1982)
 Eugene P. Wigner Research Fellow - Oak Ridge National Lab (1978)

Professional Society Memberships

Microscopy Society of America (MSA): 1978-*present*
 MicroAnalysis Society (MAS): 1979-*present*
 Australian Society for Electron Microscopy: 1988-*present*
 Midwest Microscopy and Microanalysis Society: 1990-*present*
 Microscopical Society of Canada: 1993-*present*
 New Zealand Microscopy Society – 2013-*present*
 Royal Microscopical Society (U.K): 1992-1996
 American Society for Testing of Materials: 1992-1997
 International Standards Organization: 1992-*present*
 European Microscopy Society: 1997-*present*

Professional Activities

Illinois Junior Academy of Science Region 11 Organization Committee (1985-*present*)
 Coordinator MSA Computer Workshop & Software Library (1986-*present*)
 MSA Bulletin Editor (1987-1994)
 Editor Journal of Electron Microscopy Technique (1987-1992)
 Microscopy Listserv - SysOp (1987-*present*)
 Program Committee Microscopy Society of America (1988-2019)
 Standards Committee Microscopy Society of America-Chair (1990-*present*)
 Education Committee Microscopy Society of America (1989-2012)
 University of Illinois MatSEA Alumni Board of Directors (1990-2000)
 Illinois Junior Academy of Science-Board of Directors (1990-2020)
 Director Materials Science Program Midwest Society of EM (1990-1994)
 ASTM E-42 Standards Committee (1992-1997)
 ISO Standards Committee TC-202 on Analytical Electron Microscopy - Chair- (1992-1997)
 ISO Standards Committee TC-202 on Analytical Electron Microscopy (1998-*present*)
 ISO Standards WG-202 Data Management and Treatment – Chair- (1992-2006)
 MicroBeam Analysis Society Journal Editor (1993-1996)
 President Midwest Microscopy and Microanalysis Society (1994-1996)
 Executive Council Midwest Microscopy and Microanalysis Society (2013-*present*)
 Program Chair Microscopy & Microanalysis Meeting – Kansas City, Mo (1995)
 Editor Proceedings of Microscopy & Microanalysis (1995, 1996)
 Program Chair Microscopy & Microanalysis Meeting – Minneapolis, Mn (1996)
 Editorial Board Journal of Microscopy and Microanalysis (1997-*present*)
 Editorial Board Microscopy & Analysis (1998-*present*)
 Energy Science Network Steering Committee - DoE/BES Representative (1998-2006)
 ANL MCS Computer Sciences Advisory Committee (2001-2008)
 Director Materials Science Section Microscopy Society of America (2002-2005)
 LAC Chair–Microscopy & Microanalysis Meeting Chicago-(2003-2006)
 President Microscopy Society of America (2010-2012)
 Symposium Co-Organizer Microscopy & Microanalysis Meeting (2014 -2023)

Recent Publications

Charges On A Suspended Silicon Nitride Membrane Under A High-Energy Electron Beam

Søndergaard Larsen, Mads and Hansen, Ole , Zaluzec, Nestor J , Mølhave, Kristian Speranza and Yesibolati, Murat Nulati ; *Nanoscale* , July 2025, <https://doi.org/10.1116/6.0004050>

Fabrication of α -Fe₂O₃ Nanoparticles/g-C₃N₄ Direct Z-Scheme Heterojunction of Durable Photocatalytic Activity

Alejandro Galán-González, Isaías Fernández, Nestor J. Zaluzec, Sofie Cambré, Raul Arenal, Ana M. Benito*, Wolfgang K. Maser; *ACS Applied Nano Materials* Apr 2025, Vol 8/Issue 18, doi/10.1021/acsanm.5c00991

Materials laboratories of the future for alloys, amorphous, and composite materials

Banerjee, et al. . *MRS Bulletin* **50**, 190–207 (2025). <https://doi.org/10.1557/s43577-024-00846-y>

Structural Characterization of the Platinum Nanoparticle Hydrogen Evolving Catalyst Assembled on Photosystem I by Light-Driven Chemistry

Ponomarenko, Nina; Zaluzec, Nestor J; Zuo, Xiaobing; Borkiewicz, Olaf; Hoffman, Justin; Kwon, Gihan; Martinson, Alex; Utschig, Lisa; Tiede, David; *ACS Nano* Accepted Jan 2025: <https://doi.org/10.1021/acsnano.4c08563>

Fresnel Free Imaging Mode (FFIM) for Transmission Electron Microscopy: A Computationally Mediated Solution using Spatio-Temporal Functionalization of the Illumination Optics, N. J. Zaluzec

– *Microscopy and Microanalysis*, 30 (Suppl 1), 2024, 1634–1638
<https://doi.org/10.1093/mam/ozae044.806>

TEM Characterization of Radiation-Induced Segregation at Irradiation-Induced Dislocation loops in Al_{0.3}CoCrFeNi and CoCrFeMnNi High Entropy Alloys, Wei-Ying Chen, Nestor J. Zaluzec –

Microscopy and Microanalysis, 30 (Suppl 1), 2024, 1335–1337
<https://doi.org/10.1093/mam/ozae044.659>

Direct Evidence of Phosphate Binding on Ferritin Based on Quantitative Elemental Analysis at the Single-Particle Level, Xiaoben Zhang, Wen Zhuang Nestor J. Zaluzec and Junhong Chen – *Microscopy and Microanalysis*, 30 (Suppl 1), 2024, 1684–1685 <https://doi.org/10.1093/mam/ozae044.830>***Structural Characterization of the Platinum Nanoparticle Hydrogen Evolving Catalyst Assembled on Photosystem I by Light-Driven Chemistry"***

Nina Ponomarenko; Nestor J. Zaluzec; Xiaobing Zuo; Olaf Borkiewicz; Justin Hoffman; Gihan Kwon; Alex Martinson; Lisa Utschig; David Tiede: *ACS Nano* Jan 2025 DOI: 10.1021/acsnano.4c08563

Vapor Infiltration Synthesis of Indium Sulfide Magic Size Cluster

Kihoon Kim, Shana Havenridge, Nestor J. Zaluzec, Donghyeon Kang, Nuwanthaka Jayaweera, Jeffrey W. Elam, Karen L. Mulfort, Cong Liu, and Alex B. F. Martinson
ACS Nano , Oct 2024, DOI: 10.1021/acsnano.4c10943

Synthesis of Three Isoelemental MXenes and Their Structure-Property Relationships

Marley; Shuck, Christopher; Wang, Ruocun; Michalowski, Pawel; Shochat, Jonathan; Zhang, Danzhen; Shekhirev, Mikhail; Yang, Yizhou; Zaluzec, Nestor; Arenal, Raul; May, Steven; Gogotsi, Yury
Journal of the American Chemical Society –October 2024, DOI: 10.1021/jacs.4c11111

Fabrication of model ultrafiltration membranes with uniform, high aspect ratio pores

Wen Chen, Soonmin Yim, Nestor J. Zaluzec, Gordon S. W. Craig, Seth B. Darling, Paul F. Nealey
Journal of Vacuum Science and Technology, Published on-line Oct 30 2024, DOI: 10.1116/6.0004050

Pushing the Limits of Size-Selectivity in Nanoscale Solute Separations

Feng Gao, Wen Chen, Jamila G. Eatmana, Ruben Z. Waldmana Nestor J. Zaluzec, Ruilin Dong, Paul F. Nealey, Seth B. Darling, *Nature Water* volume 2, pages 521–530 (2024)

Ti-Modified Imogolite Nanotubes as Promising Photocatalyst 1D Nanostructures for H₂ Production,

Pablo Jimenéz-Calvo, Anna Sobolewska, Mark Isaacs, Yu Zhang, Amélie Leforestier, Jéril Degrouard, Stéphan Rouzière, Claire Goldmann, Delphine Vantelon, Simon Hettler, Nestor J. Zaluzec, Raul Arenal, Pascale Launois, Mohamed Nawfal Ghazza and Erwan Paineau, *SMALL Methods* 2023 , 2301369, DOI: 10.1002/smt.202301369

Linking the Dynamic PicoProbe Analytical Electron-Optical Beam Line /Microscope to

Supercomputers, Alexander Brace, Rafael Vescovi, Ryan Chard, Nickolaus D. Saint, Arvind Ramanathan, Nestor J. Zaluzec, Ian Foster : Sept 2023 arXiv:2308.13701 <https://doi.org/10.48550/arXiv.2308.13701>

In-situ TEM investigation of void swelling in nickel under irradiation with analysis aided by computer

vision WY Chen, ZG Mei, L Ward, B Monsen, J Wen, NJ Zaluzec, AM Yacout, ... *Acta Materialia* 254, 119013 (2023)

Controlled disorder for the Yb₂Ti_{2-x}O_{7-2x} (x= 0 to 1) series and corresponding radiation tolerance

RD Aughterson, GR Lumpkin, A Bedford, P Baldo, WY Chen, NJ Zaluzec *Ceramics International* 49 (7), 11149-11157 (2023)

Quantitative Electrostatic Potential Mapping in Dense Polycrystalline Functional Materials and Devices

DB Durham, KA Aabrar, PV Ravindran, NJ Zaluzec, L Stan, AI Khan, .. *Microscopy and Microanalysis* 29 (Supplement_1), 280-281, (2023)

Solar water splitting Pt-nanoparticle photosystem I thylakoid systems: Catalyst identification, location

and oligomeric structure Lisa M. Utschig , Nestor J. Zaluzec , Tirupathi Malavath, Nina S. Ponomarenko David M. Tiede *Biochimica et Biophysica Acta (BBA) - Bioenergetics*, V1864, Issue 3, 2023, 148974, ISSN 0005-2728, <https://doi.org/10.1016/j.bbabo.2023.148974>.

Publication Synopsis

Refereed Journal Articles - 132

Refereed Book Chapters - 6

Refereed Proceedings & non-Journal Publications – 218

Non-Refereed Publications– 77

Technical Reports & Other Publications - 7

Invited Presentations, Lectures & Seminars at Conferences & Symposia –322

Invited Presentations, Lectures & Seminars (Institutional) – 74

Contributed Presentations, Lectures & Seminars at Conferences & Symposia – 112

Google Scholar: h-Factor 48 / Citations 8585 / i10-index 131

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Patents

1. *Antimicrobial Coatings* . Anil U. Mane Jeffrey W. Elam Seth B. Darling Nestor J. Zaluzec Alex B. Martinson (Sept 2023, US Patent #11846021)
2. *High Collection Efficiency X-Ray Spectrometer System With Integrated Electron Beam Stop , Electron Detector And X-Ray Detector For Use On Electron-Optical Beam Lines And Microscopes* N.J. Zaluzec (2012: US Patent # 8314386:)
3. *The Scanning Confocal Electron Microscope* N. J. Zaluzec, (2003: US Patent # 6548810)
4. *Simultaneous Specimen and Stage Cleaning Device for an AEM*, N.J. Zaluzec (1996: US Patent # 5510624)

Synergistic Activities

Journal Reviewer

Ultramicroscopy, Nano Materials, Microscopy-Today, Microscopy& Microanalysis, Chem Comm

Scientific Organizing Committees:

MM2019-2025, EMC2020, 4thInt Workshop TEM/Spectroscopy

NIH/NSF/DoE Proposal review panels

Scientific Advisory Board - Helmholtz Association Karlsruhe Germany

Facility Advisory Board - Monash University Electron Microscopy Center

Editorial Board – Microscopy & Microanalysis- Member

Editorial Board – Microscopy-Today- Member

Editorial Board – Microscopy & Analysis - Member

Past-President Microscopy Society of America – Adjunct Council Board Member

Committees: Chair – MSA Info Tech, Chair MSA Standards, Member: MSA Publications, MMMS

Advisory, ASTM-Microanalysis, ISO/TC202 Microanalysis Standards

Illinois Junior Academy of Science (Middle-HighSchool Science) Exec Board

Illinois Junior Academy of Science Region 11 Science Fair organizer

Co-Organizer EM Symposia at 4 International Meetings.

Recent Collaborators

J. Chen, P. Nealey, C Liu – UofChicago – Liquid Cell TEM, Polymer Films, , 2D Materials,
D. Tiede, L. Utshig-Johnson, A. Martinson, W. Chen , I. Foster - ANL-Analytical Microscopy
R. Arenal – Instituto de Nanociencia y Materiales de Aragon (INMA), Universidad de Zaragoza-CSIC
M.G. Burke – Idaho National Laboratory–In-situ Liquid Cell Studies in the TEM.
R. Wuhler – University of Western Sydney– SEM/EMPA
M. Garbrecht – University of Sydney – AEM
K. Molhave, M. Yesibolati – Denmark Technical University – AMEWS/LTEM
J. Damiano - Protochips – Technology for In-situ and Multimodal AEM
D. Foord, M. Ovsyanko, B. Freitag – ThermoFisher/FEI – ANL CRADA
T. O’Halloran, J. Seeler – Northwestern University – AEM characterization of BioSystems