

# ERIC W. ROTH

MICROSCOPIST • RESEARCHER  
COLLABORATOR • EXPLORER

 h-index 21  
2367 Citations

 Research  
Interest  
1,018

## PERSONAL STATEMENT

I'm a dedicated electron microscopist, sample preparation expert, and imaging artist with nearly 20 years of experience working in academic research. I sincerely enjoy what I do and see every aspect of microscopy as an art form. My goal in life is to improve the future for all humans by lending my expert steady-hand to researchers seeking collaborations, and by guiding and training the next generation of researchers in the world of electron microscopy. Do you need images for that one key figure to complete your paper? Did reviewer two ask to see cryoEM? Are you chasing a grant without any spare time to stumble through learning a difficult new technique before the submission deadline? I've got the confidence and experience you need to keep your research from suffering delays or getting scooped.

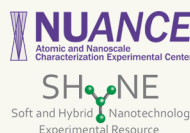
I believe in the importance of learning from mistakes, mindful mastery of technique, and building my list of skills rather than accomplishments. I approach every aspect of microscopy with careful planning, confidence, and diligent attention to detail. On the nano-scale, small mistakes cascade into failed experiments. So, my motto is, "take your time, do it once, and do it right!"

My experience crosses disciplines from biology to materials research and I'm not afraid to handle sensitive and challenging samples. My career in microscopy began at NYU where I applied classic electron microscopy sample preparation and imaging techniques to nearly every biological model available: cell lines, mouse organs and organoids, drosophila anatomy, c. elegans, etc. Today, at Northwestern University, I'm applying that experience to biological and material interfaces, hybrid material models, nanoparticles, MOF's, drug discovery, and more, using high-end analytical techniques like cryoTEM, HAADF STEM, and X-Ray microanalysis.

In the world of microscopes, if it uses high voltage in a high vacuum environment, I can play it like a fiddle. In addition to microscope operation, I have experience performing basic maintenance and troubleshooting issues such as alignment or vacuum problems. Sometimes, that means laying on my back and getting covered in oil while reaching into the guts of a microscope, and I love it all!

## EXPERIENCE

**2011 - PRESENT**  
Core Scientist / Microscopy Specialist  
**NORTHWESTERN UNIVERSITY** Evanston, IL  
Northwestern University Atomic & Nanoscale Characterization  
Experimental Center (NUANCE), BioCryo Facility  
Advanced sample preparation and electron imaging and microanalysis of  
biological and materials samples, EM facility manager



**2012 - PRESENT**  
Affiliated Scientist/Collaborator  
**NORTHWESTERN UNIVERSITY** Evanston, IL  
McCormick School of Engineering  
Material Science and Engineering - VPD Group (Vinayak Dravid, Ph. D.)  
Collaboration, training, and mentorship for grad-students and post-docs

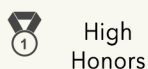


**2007 - 2011**  
Electron Microscopy Technician  
**NEW YORK UNIVERSITY** New York, NY  
New York University School of Medicine  
Skirball Institute of Biomolecular Medicine  
Office of Collaborative Sciences - Microscopy Core  
Tissue and cell sample preparation and electron imaging



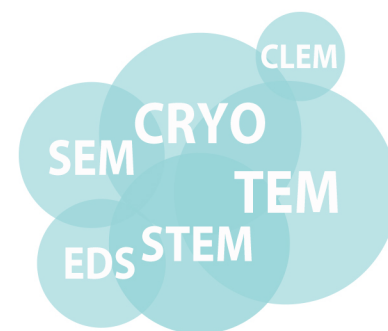
## EDUCATION

**2005 - 2007**  
**MADISON COLLEGE** Madison, WI  
Associate of Applied Science - Electron Microscopy



## SKILLS

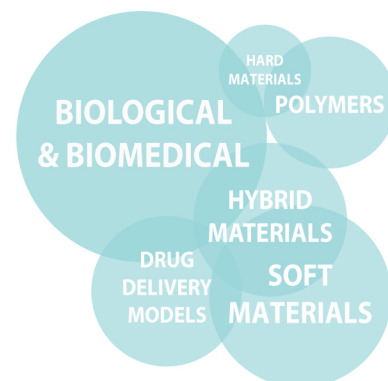
### - MICROSCOPY -



### - SAMPLE PREPARATION -



### - SPECIMENS -



### - SOFTWARE -





# ERIC W. ROTH

## PUBLISHED WORKS (2025 - 2021)

Stone PT, Kwiatkowski AJ, Roth EW, Fedorova O, Pyle AM, Wilson JT. Fabrication of RIG-I-Activating Nanoparticles for Intratumoral Immunotherapy via Flash Nanoprecipitation. *Molecular Pharmaceutics*. 2025.

Li Y, Zhou W, Zhou Y, Cheng HF, Lee B, Hu X, et al. Cocrystals combining order and correlated disorder via colloidal crystal engineering with DNA. *Science Advances*. 2025;11(16):eadu4919.

Kayaalp Nalbant E, Feliciano TJ, Mohammadlou A, Xiong VL, Trujillo JE, Calvert AE, et al. A novel therapy to ameliorate nitrogen mustard-induced limbal stem cell deficiency using lipoprotein-like nanoparticles. *npj Regenerative Medicine*. 2025;10(1):14.

Wang-Bishop L, Wehbe M, Pastora LE, Yang J, Kimmel BR, Garland KM, et al. Nanoparticle Retinoic Acid-Inducible Gene I Agonist for Cancer Immunotherapy. *ACS Nano*. 2024;18(18):11631-43.

Baljon JJ, Kwiatkowski AJ, Pagendarm HM, Stone PT, Kumar A, Bharti V, et al. A Cancer Nanovaccine for Co-Delivery of Peptide Neoantigens and Optimized Combinations of STING and TLR4 Agonists. *ACS Nano*. 2024;18(9):6845-62.

Wang X, Agrawal V, Dunton CL, Liu Y, Virk RKA, Patel PA, et al. Chromatin reprogramming and bone regeneration in vitro and in vivo via the microtopography-induced constriction of cell nuclei. *Nat Biomed Eng*. 2023;7(11):1514-29.

Waltmann C, Kennedy NW, Mills CE, Roth EW, Ikononova SP, Tullman-Ercek D, et al. Kinetic Growth of Multicomponent Microcompartment Shells. *ACS Nano*. 2023;17(16):15751-62.

Pagendarm HM, Stone PT, Kimmel BR, Baljon JJ, Aziz MH, Pastora LE, et al. Engineering endosomolytic nanocarriers of diverse morphologies using confined impingement jet mixing. *Nanoscale*. 2023;15(39):16016-29.

Lin Y, Gao X, Yue J, Fang Y, Shi J, Meng L, et al. A soil-inspired dynamically responsive chemical system for microbial modulation. *Nature Chemistry*. 2023;15(1):119-28.

Khan S, Shoaib M, Molaei N, Wani OB, Chen Z, Vuong TV, et al. Cellulose Nanocrystals' Role in Critical Mineral Beneficiation: Dual Aggregate-Dispersant Behavior Supports Environmentally Benign Nickel Processing. *ACS Sustainable Chemistry & Engineering*. 2023;11(4):1294-304.

Vu TQ, Peruzzi JA, Sant'Anna LE, Roth EW, Kamat NP. Lipid Phase Separation in Vesicles Enhances TRAIL-Mediated Cytotoxicity. *Nano Lett*. 2022;22(7):2627-34.

Shofolawe-Bakare OT, de Mel JU, Mishra SK, Hossain M, Hamadani CM, Pride MC, et al. ROS-Responsive Glycopolymeric Nanoparticles for Enhanced Drug Delivery to Macrophages. *Macromolecular Bioscience*. 2022;22(12):2200281.

Mills CE, Waltmann C, Archer AG, Kennedy NW, Abrahamson CH, Jackson AD, et al. Vertex protein PduN tunes encapsulated pathway performance by dictating bacterial metabolosome morphology. *Nature Communications*. 2022;13(1):3746.

McCourt JM, Kewalramani S, Gao C, Roth EW, Weigand SJ, Olvera de la Cruz M, et al. Electrostatic Control of Shape Selection and Nanoscale Structure in Chiral Molecular Assemblies. *ACS CentralScience*. 2022.

Landy KM, Gibson KJ, Urbach ZJ, Park SS, Roth EW, Weigand S, et al. Programming "Atomic Substitution" in Alloy Colloidal Crystals Using DNA. *Nano letters*. 2022.

De Mel J, Hossain M, Shofolawe-Bakare O, Mohammad SA, Rasmussen E, Milloy K, et al. Dual-Responsive Glycopolymers for Intracellular Codelivery of Antigen and Lipophilic Adjuvants. *Molecular Pharmaceutics*. 2022;19(12):4705-16.

Song Q, Wang X-Q, Holmes TR, Bonkowski M, Roth EW, Ponedal A, et al. Epidermal SR-A Complexes Are Lipid Raft Based and Promote Nucleic Acid Nanoparticle Uptake. *Journal of Investigative Dermatology*. 2021;141(6):1428-37. e8.

Ribet SM, Murthy AA, Roth EW, dos Reis R, Dravid VP. Making the most of your electrons: Challenges and opportunities in characterizing hybrid interfaces with STEM. *Materials Today*. 2021;50:100-15.

Ribet S, Murthy A, Roth E, Hu X, dos Reis R, Dravid V. Emerging Opportunities in STEM to Characterize Soft-Hard Interfaces. *Microscopy and Microanalysis*. 2021;27(S1):616-8.

Mills CE, Waltmann C, Archer AG, Kennedy NW, Abrahamson CH, Jackson AD, et al. Vertex protein PduN tunes encapsulated pathway performance by dictating bacterial metabolosome morphology. *bioRxiv*. 2021.

Lee HC, Balough JL, Roth EW, Vaccari S, Duncan FE. A decellularized oocyte-derived scaffold provides a "sperm safe" to preserve mammalian spermatozoa. *Andrology*. 2021.

## MINI GALLERY





# ERIC W. ROTH



## PROFESSIONAL DEVELOPMENT AND HONORS

### Guest Lecturer

Northwestern IBI, Practical Training in Chemical Biology Methods and Experimental Design, 2021, 2022, 2023

### Volunteer

Boys&Girls Club in collaboration with NU Science in Society  
"Mr. Microscope" talks to kids about Nanoscience, 2023, 2024, 2025

### Cover Images

Andrology Vol 9, Issue 3, May 2021  
Nature Chemical Biology Vol 13, No 8, August 2017  
Integrative Biology, Vol 9, No 2, February 2017  
Cell Host and Microbe Vol 10 Issue 3, September 2011

Museum of Science and Industry  
Chicago, IL, Image on display,  
May 2018

Northwestern University Office for Research Outstanding Core Facility  
Award: 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019  
(discontinued 2020)

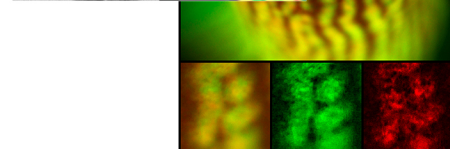
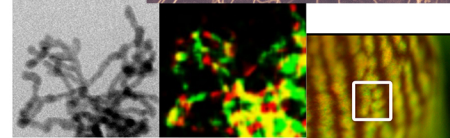
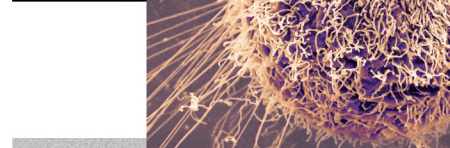
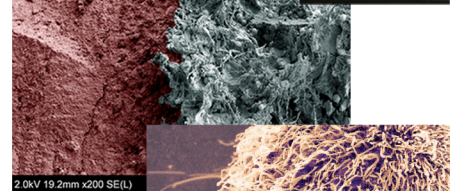
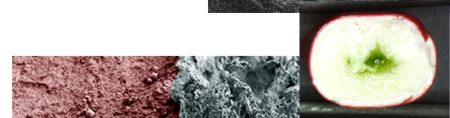
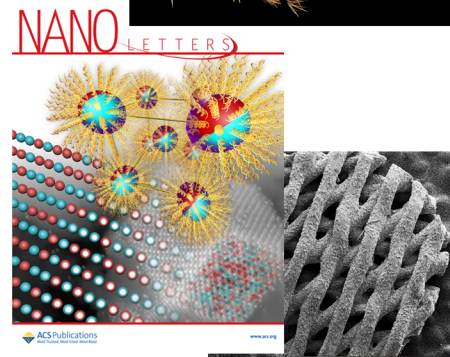
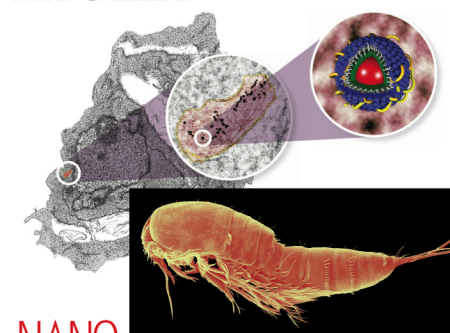
Northwestern Kellogg School of Management, *Leadership and Management in Core Facilities*  
November 2017

Microbiology, 3e, by Slonczewski/Foster for WW Norton Publishers, Sept. 2013  
Segmented Filamentous Bacteria colored SEM image featured figure in textbook

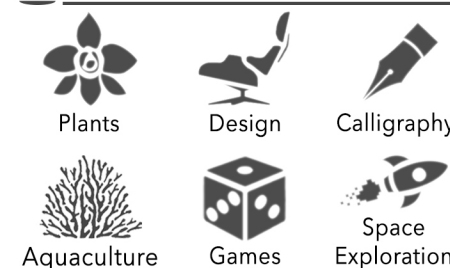
Peer Reviewer, Microscopy and Microanalysis, Cambridge University Press, 2012-2013

Landmark Worldwide  
Landmark Forum 2023.05  
Advanced Course 2023.06  
Living Passionately 2023.06

## MINI GALLERY



## INSPIRATIONS



## PUBLISHED WORKS CONT. (2021 - 2019)

Hershewe JM, Warfel KF, Iyer SM, Peruzzi JA, Sullivan CJ, Roth EW, et al. Improving cell-free glycoprotein synthesis by characterizing and enriching native membrane vesicles. *Nature Communications*. 2021;12(1):1-12.

De Mel JU, Gupta S, Harmon S, Stingaciu L, Roth EW, Siebenbueger M, et al. Acetaminophen Interactions with Phospholipid Vesicles Induced Changes in Morphology and Lipid Dynamics. *Langmuir*. 2021;37(31):9560-70.

Zhang F, Hu X, Roth EW, Kim Y, Nguyen ST. Template-Assisted, Seed-Mediated Synthesis of Hierarchically Mesoporous Core-Shell UiO-66: Enhancing Adsorption Capacity and Catalytic Activity through Iterative Growth. *Chemistry of Materials*. 2020;32(10):4292-302.

Wang S, Park SS, Buru CT, Lin H, Chen P-C, Roth EW, et al. Colloidal crystal engineering with metal-organic framework nanoparticles and DNA. *Nature Communications*. 2020;11(1):1-8.

Li Y, Eshein A, Roth E, Bleher R, Backman V. Quantifying Three-Dimensional Chromatin Packing through Electron Tomography. *Biophysical Journal*. 2020;118(3):334a.

Kim J-H, Koppolu S, Akturk E, Roth E, Walters MA. Formation of a Lanthanoid Complex Shell on a Nanoparticulate Wax Core. *Inorganica Chimica Acta*. 2020:119725.

Kennedy NW, Hershewe JM, Nichols TM, Roth EW, Wilke CD, Mills CE, et al. Apparent size and morphology of bacterial microcompartments varies with technique. *PloS one*. 2020;15(3):e0226395.

Hershewe JM, Warfel KF, Iyer SM, Peruzzi JA, Sullivan CJ, Roth EW, et al. Improving cell-free glycoprotein synthesis by characterizing and enriching native membrane vesicles. *bioRxiv*. 2020.

Zhang X, Hao S, Tan G, Hu X, Roth EW, Kanatzidis MG, et al. Ion Beam Induced Artifacts in Lead Based Chalcogenides. *Microscopy and Microanalysis*. 2019;25(S2):2262-3.

Wang S, Du JS, Diercks NJ, Zhou W, Roth EW, Dravid VP, et al. Colloidal Crystal "Alloys". *Journal of the American Chemical Society*. 2019.

Moreau LM, Jones MR, Roth EW, Wu J, Kewalramani S, O'Brien MN, et al. The role of trace Ag in the synthesis of Au nanorods. *Nanoscale*. 2019;11(24):11744-54.

Li Y, Roth E, Agrawal V, Eshein A, Fredrick J, Almssalha L, et al. Quantifying three-dimensional chromatin organization utilizing scanning transmission electron microscopy: Chromstem. *bioRxiv*. 2019:636209.

Please, see my Google Scholar profile for more published work from 2019-2010.

