

Nicholas R. Sesing

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RESEARCH INTERESTS

My primary interests are in the advancement of photovoltaic cells, batteries, capacitors, and electronics with low dimensional nanomaterials.

EDUCATION

University of Georgia

Doctor of Philosophy in Chemistry

Athens, GA

Aug 2020 – July 2025 (est.)

University of Wisconsin-Madison

Bachelor of Science in Chemistry

Bachelor of Science in Economics

Madison, WI

Dec 2012

Dec 2012

Marine Corps University (Distance Education Program)

Expeditionary Warfare School (Distinguished) Graduate

Quantico, VA

May 2023

RESEARCH EXPERIENCE

Inorganic and materials projects, with the guidance of Dr. Tina Salguero Dec 2020 - Present

- One-dimensional materials synthesized via chemical vapor transport (CVT): MoI_3 , NbS_3 , $(\text{TaSe}_4)_2\text{I}$, NbS_4 , TaS_3 , $(\text{NbS}_4)_4\text{I}$, MoBr_3 , $(\text{NbSe}_4)_3\text{I}$, NbBr_5 , $(\text{Nb}_4\text{Se}_{15}\text{I}_2)_2$, TiS_3 , $\text{Nb}_x\text{Ta}_{1-x}\text{S}_3$
- One-dimensional material synthesized via boron chalcogen method (BCM): NbS_3
- One-dimensional material synthesized via salt flux growth: $(\text{NbS}_4)_4\text{I}$, $\text{Nb}_{24}\text{S}_{95}\text{Cl}_7$
- One-dimensional materials synthesized via solid state synthesis: TaSe_3
- Two-dimensional materials synthesized via CVT: 1T-TaS_2 , Nb_3I_8 , 1T-TaTe_2 , 1T-TaSe_2 , NbTe_2 , UTe_2 , $\alpha\text{-UTe}_3$, $\beta\text{-UTe}_3$, $\beta\text{-USe}_2$, USe_3 , ThTe_3 , $\text{Th}_x\text{U}_{1-x}\text{Te}_3$
- Two-dimensional materials synthesized via solid state synthesis: $\text{Nb}_7\text{S}_2\text{I}_{19}$, Nb_3SI_7 , ThTe_3
- Two-dimensional materials synthesized via Molten Salt Flux Liquid Transport Method (MSFLT) and/or flux growth: UTe_2 , $\alpha\text{-UTe}_3$, $\beta\text{-UTe}_3$
- Two-dimensional materials synthesized via hydrothermal reactions: LiCoPO_4
- Three-dimensional materials synthesized via CVT: Cu_3NbS_4 , NbAs
- Lithium-ion battery cathode material re-lithiation
- Arc melting 1T-TaSe_2 and TaSe_3
- Analysis methods employed: PXRD, SCXRD, SEM/STEM, EDS, electron diffraction, Raman, TGA/DSC, VSM, neutron diffraction
- Miscellaneous equipment operated, maintained, repaired, and trained others in: gloveboxes, tube and box furnaces, ovens, Schlenk lines, vacuum pumps, centrifuges, torches, freeze dryer

- Industrial Hygienist with Naval Hospital Camp Pendleton
 Diesel exhaust particulate exposure of Marines operating AAVs Aug - Nov 2019
- Sampling and analysis of potential over-exposure to Assault Amphibious Vehicle personnel
- Weapons fire impulse noise measurements Jun - Nov 2019
- Sampling and analysis of impulse noise from various weapons systems via advanced meters

- UW-Madison, with the guidance of Dr. Pamela Doolittle
- Gold nanoparticle generation Jun 2012 - Dec 2012
- Generation of nanoparticles via environmentally considerate means
- Silver solubility as a function of chloride concentration Jan 2012 - May 2012
- Monitored free ion concentration for metals as dependent upon of the concentration of other ions
- Phosphorous and nitrogen content related to algae blooms Jul 2011 - Dec 2011
- Studying the direct effects of two ions on fresh-water algae growth
 - Became foundation for culminating undergraduate analytical laboratory experiment

TEACHING EXPERIENCE

- Grader, University of Georgia Dept. of Chemistry Sep 2021 – Aug 2022
 - Grade exams and homework assignments for nearly 1,000 undergraduate students per semester
- Prevention of and Response to Suicide Bombing Incidents Aug 2017 - May 2018
 - Taught three sessions to (45) Marines of local security force as a certified DHS trainer
- UW-Madison Faculty Assistant, Analytical Chemistry (H) 329 Jan 2013 - Jul 2013
 - Instructed discussion and laboratory sections, held tutoring sessions, and graded exams and coursework. 20-25 students in each section. Professor was Dr. Linda Zelewski, Lab Director was Dr. Pamela Doolittle.

PUBLICATIONS

- **Sesing, N.R.**, Shultz-Johnson, L., Buturlim, V., Frontzek, M., Regmi, S., Chen, S.A., Greer, R., Gofryk, K., Salguero, T.T., Rai, B.K. Unravelling Crystallization Pathways and Magnetic Behaviors in UTe₃ Polymorphs..... *In preparation*.
- **Sesing, N.R.**, X.X, Salguero, T.T. Best Practices for the Chemical Vapor Transport Crystal Growth of Tantalum Chalcogenides. *In preparation*.
- Taheri, M, **Sesing, N.R.**, Salguero, T.T., Balandin, A.A. High FE Mobility of CDWs in Nanowire TaS₃. *In preparation*.
- Norvell, B.R., **Sesing, N.R.**, Salguero, T.T. Revisiting the Triclinic Structure of NbS₃-I. *In preparation*.
- Teeter, J., Kim, N.Y., Debnath, T., **Sesing, N.R.**, Geremew, T., Wright, D., Chi, M., Stieg, A.Z., Miao, J., Lake, R.K., Salguero, T.T., Balandin, A.A. Achieving the One-Dimensional Atomic Chain Limit in van der Waals Crystals. *Advanced Materials*. 14 Oct 2024.
- Geremew, T., Taheri, M., **Sesing, N.R.**, Ghosh, S., Kargar, F., Salguero, T.T., Balandin, A.A. Development of Inks with Fillers of NbS₃ Quasi-One-Dimensional Charge-Density-Wave Material. *Applied Electronic Materials*. 4 June 2024.
- Taheri, M, **Sesing, N.R.**, Salguero, T.T., Balandin, A.A. Electrical-Field Modulation of the Charge-Density-Wave Quantum Condensate in h-BN/NbS₃ Quasi-2D/1D Heterostructure Devices. *Applied Physics Letters*. 5 Dec 2023.
- Zhu, Y., Antoniuk, E.R., Cheon, G., Wright, D., Kargar, F., **Sesing, N.R.**, Sendek, A.D., Salguero, T.T., Bartels, L., Balandin, A.A., Reed, E.J., da Jornada, F.H. Machine-Learning-

Driven Expansion of the 1D van der Waals Materials Space. *Journal of Physical Chemistry Letters*. 27 Oct 2023.

- Barani, Z., Geremew, T., Stokey, M., **Sesing, N.R.**, Taheri, M., Hilfiker, M.J., Kargar, F., Schubert, M., Salguero, T.T., Balandin, A.A. Quantum Composites with the Charge-Density-Wave Fillers. *Advanced Materials*. 22 Feb 2023.
- Kargar, F., Barani, Z., **Sesing, N.R.**, Mai, T.T., Debnath, T., Liu, Y., Zhu, Y., Biacchi, A.J., da Jornada, F.H., Bartels, L., Hight Walker, A.R., Davydov, A., Salguero, T.T., Lake, R.K., Balandin, A.A. Elemental Excitations in MoI_3 One-Dimensional van der Waals Nanowires. *Applied Physics Letters*. 28 Nov 2022.
- Ghosh, S., Kargar, F., **Sesing, N.R.**, Barani, Z., Salguero, T.T., Yan, D., Rumyantsev, S., Balandin, A.A. Low-Frequency Current Fluctuations in Quasi-1D $(\text{TaSe}_4)_2\text{I}$ Weyl Semimetal Nanoribbons. *Advanced Electronic Materials*. 20 Nov 2022.
- Taheri, M., Brown, J., Rehman, A., **Sesing, N.R.**, Kargar, F., Salguero, T.T., Rumyantsev, S., Balandin, A.A. Electrical Gating of the Charge-Density-Wave Phases in Two-Dimensional h-BN/1T-TaS₂ Devices. *ACS Nano*. 31 Oct 2022.
- **Sesing, N.R.** Botero y su Descripción de la Violencia en Colombia. *¡Albricias!*, 28-29. Fall 2008.

PRESENTATIONS

Transition Metal Halide and Chalcogenide Nanowires: Synthesis, Structures, and Emerging Uses Oct 2023

- Presented at the Nanowire Week 2023 Poster Session aboard Georgia Tech

Transition Metal Chalcogenides, Halides & Chalcogenides: Synthesis and Emerging Uses Mar 2023

- Presented at the Spring Battelle Savannah River Alliance, LLC (BSRA) University Research Poster Session aboard Savannah River National Lab

Military-specific presentations

Nov 2014 – Present

- Numerous classes concerning fire/LASER/motorcycle/HAZMAT/weapons safety, rear/forward/main Combat Operations Center construct, Administration and Logistics Operation Center construct, close air support, combat reports, communications equipment, detainee handling, land navigation, immediate action drills/standard operation procedures, and convoy operations/orders

Air Quality Awareness, Camp Pendleton Environmental Security

2020

- Developed slide deck involving the numerous aspects of air quality considerations and laws, presented to three groups aboard Camp Pendleton

Athens Area Military Officers Association of America

Feb 2022

- Invited to speak in promotion of the student veterans of the University of Georgia while sharing personal story

Lead Awareness and Ergonomics Awareness, Naval Hospital Camp Pendleton

Oct 2019

- Developed two slide decks for the Safety Officers of 1st Marine Division and 1st Marine Logistics Group, potentially standardizing mandatory annual training for up to 45,000 personnel

Local exhaust ventilation system operations, Naval Hospital Camp Pendleton

Sep 2019

- Standardized measurements and understanding of vehicle exhaust and its capture with 20 Industrial Hygienists from five Department of the Navy offices

Noise measurement and control, Naval Hospital Camp Pendleton

Apr 2018

- Instructed 25 hearing-conservation-related medical professionals

Undergraduate Poster Symposium, UW-Madison

May 2012

- Presented research on silver solubility as a function of free ions

PROFESSIONAL HISTORY

Lab Manager, University of Georgia Department of Chemistry, Athens, GA May 2022 - Present

- Update the lab's chemical safety plan annually, accounting for new hazards, controls, and SOPs
- Coordinate and oversee the configuration, move, sanitation, and set up of a laboratory from one facility to another
- Coordinate with UGA's facilities maintenance division for electrical and plumbing jobs
- Coordinate with outside vendors and US customs on ordering equipment and reagents
- Account for and manage the storage of over 700 reagents in seven lab spaces
- Manage the disposal and handling of all laboratory waste
- Provide for the safety and training of fifteen group members

Logistics Officer, United States Marine Corps (see federal resume) Nov 2013 - Present

- Logistics Officer and Motor Transport Officer (Reserve), 4th Air Naval Gunfire Liaison Company, Force Headquarters Group
 - Support simultaneous distributed operations as the unit logistics, motor transport, and supply officer
- Logistics Officer (Reserve), 4th Light Armored Reconnaissance Battalion, 4th Marine Division
 - Provided for 406 Marines and Sailors for one month in NATO exercise in Norway
- Maintenance Management Officer, Company Executive Officer, Headquarters Battalion, 1st Marine Division
 - Managed the equipment readiness of gear set valued at over \$130 million and the support and training of 700 personnel
- Assistant Logistics Officer, 1st Battalion, 1st Marines, 1st Marine Division
 - Oversaw the provision of all facets of logistics for a 1,200 person force engaged in exercises across Australia for a period of 7 months
- Motor Transport Platoon Commander, Headquarters Battalion, 1st Marine Division
 - Provided leadership for 60 personnel in support of pre-deployment training and tactical motor-transport

Student Laboratory Assistant, Center for Applied Isotope Studies, Athens, GA Aug 2021 – Jan 2024

- Operate three dual inlet mass spectrometers simultaneously, testing isotopic ratios for both carbon and hydrogen samples
- Operate high temperature conversion elemental analyzer isotope ratio mass spectrometer for hydrogen isotope ratio measurement

Physical Scientist, Environmental Security Department, Camp Pendleton Nov 2019 - Jul 2020

- Plan, coordinate, develop, and maintain oversight of MCB Camp Pendleton's air quality programs
- Coordinate air quality studies and programs for a base with a population of over 70,000, monitor emissions and their sources, complete air quality reporting, and acquire/manage 250+ permits
- Provide regulatory liaison and facilitate inspections and audits to ensure mandated compliance

Industrial Hygienist, Naval Hospital Camp Pendleton Nov 2018 - Nov 2019

- Anticipate, recognize, evaluate, and control workplace environmental factors which may cause sickness, impaired health and well-being, or significant discomfort and inefficiency among workers.
- Complete periodic industrial hygiene (PIH) surveys of 10 units aboard Camp Pendleton. This included surveying 104 shops and 441 processes for these units, ensuring the well-being of their 4,320 active-duty service members, 363 reserve service members, 14 civilian employees, and 41 contractors.
- Measure and analyze welding fume, respirable silica, and diesel exhaust exposure. Measure local exhaust ventilation, light, and noise levels, and evaluate respiratory protection, hearing conservation, personal protective equipment, blood-borne pathogens, occupational reproductive hazard, sight conservation, lead, hazardous material/waste, engineering controls, and ergonomics programs.

Analytical Stockroom Assistant, UW-Madison Aug 2013 - Oct 2013

- Prepare solutions and laboratory equipment for eight laboratory sections

COMMUNITY SERVICE

UGA Student Veterans Association Sep 2020 - Present
Chapter Vice President, Director of Recruitment and Engagement, Liaison to the Division of Student Affairs Advisory Board

- Plan and support veteran-related events, including veteran recognition and collaboration with charitable partners
- Serve on the Dean-of-Students-led board for the replacement of the Student Veterans Resource Center Director

UGA Academic Honesty, Athens, GA Aug 2020 - Present
Academic Honesty Panelist

- Review materials related to an academic honesty allegation, hear from the instructor and student, and decide whether a violation of the policy has occurred

Chemistry Graduate Student Organization Sep 2020 - Present
Community Service Chair

- Orient 40+ first-year graduate students and prospective graduate students from two incoming classes to the department and university
- Organize and participate in community service projects, from park and campus cleanups to food distribution to educational visits at local high schools

Blue Key National Honor Society Mar 2021 - Present
Voting Member

- Serve on three new member selection committees
- Inducted on basis of scholarship, leadership, and service while at the University of Georgia

Navy and Marine Corps Relief Society, Camp Pendleton, CA Apr 2019 - Jan 2021
Thrift Store and Public Outreach Volunteer

- Sort, test, and prepare merchandise for sale at a non-profit thrift store
- Educate active duty Marines and Sailors about the benefits available through the society
- 430+ hours volunteered

Seasons Hospice and Palliative Care, Vista, CA Sep 2018 - Feb 2020
Hospice Volunteer

- Provide comfort to patients and their family during hospice care
- 40 hours volunteered

Saint Vincent de Paul Food Pantry, Madison, WI Jan 2013 - Oct 2013
Food Pantry Volunteer

- Stock food and basic life items, assist clients in selection of items
- 85 hours volunteered

GRANTS AND SCHOLARSHIPS

- Neutron Beam Award at High Flux Isotope Reactor (HFIR) Aug 2024, Mar 2025
 - Awarded for diffraction testing of α - UTe_3 and β - UTe_3 at Oak Ridge National Lab
 - Awarded for diffraction testing of USe_3 and ThTe_3 at Oak Ridge National Lab

- UGA Foundation Scholarship Feb 2024, Oct 2024
 - Scholarship received on basis of being a student veteran with UGA ideals
- UGA Summer Research Grant Apr 2024
 - \$1,490 received on basis of being a graduate student with strong research potential
- Colonel and Mrs. James A. Franklin Student Veterans Scholarship Oct 2023
 - Scholarship received on basis of being a student veteran with leadership excellence
- UGA Summer Research Grant Mar 2023
 - \$1,495 received on basis of being a graduate student with strong research potential
- UGA Summer Research Grant Apr 2022
 - \$1,460 received on basis of being a graduate student with strong research potential
- UGA Foundation Grant Apr 2023, Oct 2023
 - Scholarship received on basis of being a student veteran with UGA ideals
- Horton-Devore Leadership Award Oct 2022
 - Scholarship received on basis of being a student veteran with leadership excellence
- Lockheed Martin STEM Award Dec 2020, Apr/Dec 2021, Apr 2022
 - Scholarship received on basis of being a student veteran in STEM

HONORS AND AWARDS

- Northeast Georgia Section of the American Chemical Society Outstanding Graduate Student of the Year Apr 2023
 - Awarded for accomplishment at University of Georgia from 2022 to 2023
- Navy and Marine Corps Commendation Medal Oct 2021
 - Awarded by the Commanding General of 4th Marine Division for meritorious service from July 2018 to Aug 2021
- Selection for UGA Chapter of the Blue Key National Honor Society Mar 2021
 - One of 70 inductees from a population of 40,000 on basis of leadership, service, academics, and character
- Military Outstanding Volunteer Service Medal Apr 2020
 - Awarded for volunteer service from January 2013 to April 2020
- Meritorious Service Medal May 2018
 - Awarded on behalf of the President of the United States for outstanding meritorious service between November 2014 to May 2018
- 2017 Marine Corps Individual Safety Award Feb 2018
 - Sole Marine Corps Officer for significant contributions and accomplishments in the field of safety, mishap prevention, and force preservation
- Motor Transport Association Honor Graduate Nov 2014
 - Top graduate for motor transport portion of Logistics Officers Course
- Recognition of Outstanding Student Employee Award, UW-Madison Housing May 2010
 - Annual top 1% of student workforce

TECHNICAL SKILLS

Powder X-Ray Diffraction (XRD), Single Crystal XRD, Scanning Electron Microscopy/ Energy Dispersive X-ray Spectroscopy (SEM/EDS), Scanning Transmission Electron Microscopy (STEM), Electron Diffraction, Raman spectroscopy, Dual Inlet Mass Spectroscopy, Thermogravimetric Analysis (TGA), High-Performance Liquid Chromatography (HPLC), OSHA 10-hour, Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES), UV-Visible spectrophotometry, Hazardous Materials Prep & Response, chemical safety training for faculty, HAZMAT-handler certified, LabView, sampling for noise, mold, light, and various fumes/gasses/and respirable particles, laboratory equipment upkeep and repair

SOFTWARE SKILLS

Microsoft suite, Photoshop, GIMP, Diffrac-Eva, TOPAS, CrystalMaker suite, OriginLab, HighScore, AZtecTEM, Leica, OMNIC, ImageJ, MatLab, Mantid

LANGUAGES

Native English, intermediate Spanish