

Vasiliki (Vicky) Karanikola

Chemical and Environmental Engineering, College of Engineering, The University of Arizona

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Website: <https://kores.lab.arizona.edu/>

EDUCATION

PhD in Environmental Engineering; Minor in Civil Engineering, August 2015

University of Arizona, Tucson, AZ

Dissertation Title: Membrane Distillation: Parametric Study and Numerical Simulations of Hollow Fiber and Flat Sheet Membranes

Master of Science Environmental Engineering, May 2013

University of Arizona, Tucson, AZ

Title: Sweeping Gas Membrane Distillation: Numerical Simulations of Mass and Heat transfer through a Hollow Fiber Membrane Contactor

Master of Science in Civil Engineering; Focus Filtration, September 2009

San Diego State University, San Diego, CA

Thesis Title: Plankton Filtration with Flexible Particulate Packs

Bachelor of Science in Mechanical Engineering; Focus Energy, April 2005

Advanced Technological Institute of Serres, Serres, Greece

Ranked on 10th percentile of graduating class, Certified Mechanical Engineer in Greece

Skills: *Advanced:* mathematical modeling, membrane systems, teaching, technical writing, MathCAD, engineering optimization, project management, data analysis, AutoCAD, Shake91, GeoStudio, PHASE², Matlab, Visual Basic; *Familiar:* ETDOT, membrane autopsies, Photoshop, imovie, DEM

Spoken languages: Greek (native), English (fluent), French (fluent), Italian (conversational) and Spanish (conversational)

Selected Courses: Advanced Water Treatment, Water & Wastewater Treatment, Water Chemistry, Environmental Transport Processes, Hazardous Waste Management, Air Pollution, Finite Elements, Soil Mechanics, Soil Dynamics

PROFESSIONAL EXPERIENCE

University of Arizona, Tucson, AZ

August 2020- present

Courtesy Appointment, Department of Biosystems Engineering

- Mentor students and collaborate with faculty members

University of Arizona, Tucson, AZ

August 2019- present

Assistant Professor, Department of Chemical and Environmental Engineering

- Conduct research in the fields of desalination, membrane filtration, and water treatment
- Lead design and optimization solar membrane systems for off-grid water purification
- Participate in graduate environmental engineering committee.
- Advise graduate and undergraduate students
- Run graduate student seminars
- Faculty advisor for ACES and EWB-USA UA chapter

Yale University, New Haven, CT

September 2017- 2019

Postdoctoral Associate, Department of Chemical and Environmental Engineering

- Conduct research in the fields of membrane-based technologies at the water-energy nexus
 - Conduct research on membrane fabrication and characterization, membrane performance evaluation, and process/system analysis
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- Participate and write proposals relevant to the membrane and desalination field.

University of Arizona, Tucson, AZ

September 2016- 2017

Assistant Research Professor, Department of Chemical and Environmental Engineering

- Conduct research in the fields of desalination, membrane filtration, membrane distillation\
- Lead design and construction of pilot scale system to control struvite precipitation at wastewater reclamation facility using biogas.
- Instructed new Environmental Engineering sophomore course, Environmental Eng. Careers
- Participate and lead in new Environmental engineering program in undergraduate committee.
- Participate in committee for implementing Cooperative program in the Chemical and Environmental Engineering Undergraduate Program
- Participate and lead proposal for undergraduate laboratories upgrading and improvement.
- Advise undergraduate students

University of Arizona, Tucson, AZ

September 2015- 2016

Faculty, Adjunct Instructor, Department of Chemical and Environmental Engineering

- Co-instructed Water Chemistry Laboratory, instructed selected water chemistry lectures
- Designed and prepared lectures for new Environmental Engineering sophomore course, Environmental Eng. Careers
- Participated and held administrative role in starting new undergraduate environmental engineering program; worked with curriculum affairs and College of Engineering
- Advising of undergraduate students

University of Arizona, Tucson, AZ

September 2015- 2016

Research Associate, Solar Membrane Distillation Group

- Solar membrane distillation laboratory lead
- Supervised group of undergraduates and graduate students while working on experimental objectives

Engineers Without Borders- University of Arizona Chapter, Tucson, AZ September 2015- present
Faculty Advisor

- Advise and consult for community development project in the San Carlos Apache Reservation.
- Advise and consult for well design, farming and irrigation project in the Sabana Mula, Dominican Republic.

Commitment per week \pm 10 hours.

University of Arizona, Tucson, AZ

September 2010- 2015

Teacher Assistant

Classes: Water Treatment design, Environmental Water Engineering, Elements of Chemical Engineering I, Engineering Economics, Dynamics and Solid Mechanics

- Substituted for multiple lectures and managed and reviewed exams.
- Held office hours, organized exam reviews, and graded assignments.

Engineers Without Borders- University of Arizona Chapter, Tucson, AZ
Project Manager, Sanitation Project in Marquirivi Bolivia

May 2013- 2015

- Organized and led structural, waste water treatment, water supply and construction planning design teams for sanitation project in Bolivia, that included 5 shower structures and 50 latrines
- Compiled multiple technical reports, submitted to TAC of EWB-USA with successful technical approval
- Planned and led one assessment trip and one implementation trip to Bolivia for location assessment, testing and implementing sanitation project.
- Supervised all construction in community

- Wrote multiple grants, organized grant committee for all project budget funds, controlled all funds from Rotary and University of Arizona, allocated for the project
- Planned and led several workshops such as soil characterization, land surveying, concrete, masonry and structure assembly workshops at the University of Arizona campus as part of constructing a prototype latrine
- Commitment per week \pm 20 hours.

San Diego State University, San Diego, CA

September 2007- December 2009

Teacher Assistant

Classes: Geotechnical Engineering, Foundation Engineering and Earth Retaining Structures and Solid Mechanics

- Instructed solid mechanics laboratory
- Graded and supervised exams

ASTERISMOI SA, Construction Company, Thessaloniki, Greece

September 2006- July 2007

Mechanical Engineering Studies

- Consulted and performed all mechanical engineering studies for over 60 buildings
- Supervised construction and installation of heating, air conditioning, and elevators systems

Phaethon C. Karanicolas Construction Company, Thessaloniki, Greece

April 2005-September 2006

Construction Site supervisor

- Assisted supervising and project managing residential construction site. Performed multiple field assessment tests, surveying and delegated tasks during construction. Participated in design/build team for over 100 residential housing projects

RESEARCH EXPERIENCE

University of Arizona, Tucson, AZ

September 2011- 2015

Graduate Research Assistant, Solar Membrane Distillation Group

Advisors: Dr. Wendell Ela, Dr. Robert Arnold

- Designed, constructed and operated multiple lab scale membrane distillation systems. Managed solar membrane distillation laboratory; responsibilities included lab personnel training, material and equipment purchasing and safety training
- Developed theoretical mathematical hollow fiber and flat sheet membrane distillation simulation model for predicting water production of various systems configurations and operationally optimizing field scale systems.
- Assisted with design of two autonomous pilot scale solar-driven hollow fiber membrane distillation systems in Marana and the Navajo Nation
- Performed reverse osmosis membrane autopsies including inspection and analysis of RO membrane elements utilizing HPC, SEM, SEM-EDs, ATR-FTIR, and XRD techniques

National Centre of Excellence in Desalination Australia (NCEDA), Perth, AUS

April 2013

Research Visiting Scholar

- Assisted and evaluated Multi-Effect-Distillation (MED) process in NCEDA lab center as part of the development of a cost-effective hybrid solar/waste thermal system to power an innovative thermal vacuum-multi-effect-membrane-distillation desalination system for remote inland application in the Australian outback

San Diego State University, San Diego, CA

September 2007- December 2009

Graduate Research Assistant, Geo-innovation Research Group in Civil Engineering

- Operated multiple lab scale geotechnical equipment, perform soil mechanics and dynamics experiments
- Trained and managed Geo-innovation and soil testing laboratory

Advanced Technological Educational Institute of Serres, Greece

December 2004- February 2005

Research Assistant in the Department of Mechanical Engineering

- Undergraduate Research Assistant in project “Study of electrical and mechanical blueprints and installations for SPA Hotel in Greece”

RESEARCH PROPOSALS (Encouraged/ Finalist/Funded)

PI, Selective Recovery of Volatile Resources from Wastewater, DOE 2020. FOA# DE-FOA-0002336, \$1,375,000 (**Encouraged, final submission in review**)

PI, Tunable salt rejection membranes for enhanced energetics and high recovery in brackish water desalination, USBOR 2020. FOA# BOR-DO-F014, \$150,000 (**Phase II, in progress for final review**)

PI, Agnese Helms Haury Program in Environment and Social Justice: Off-grid Water Purification Units, \$45,000 **2020-2021**

Senior Personnel, NRT-INFEWS: Indigenous Food, Energy, and Water Security and Sovereignty (IndigeFEWSS), National Science Foundation, Division of Graduate Education (**2019-2022**)

Co-PI, Direct solar heat-to-pressure novel Batch Reverse Osmosis hybridized with a Nanoengineered-surface variant of Multi-Effect Distillation, DoE 2017. FOA# DE-FOA-0001778, \$2,000,000 (**Encouraged**)

PI, Agnese Helms Haury Program Seed Grant University of Arizona, 2017, Sustainable Off-grid San Carlos Apache Water Purification, \$10,000 (**Awarded**)

PI, Sustainable Off-grid San Carlos Apache Water Purification. Submitted to the University of Arizona Foundation for Challenge funding of the Agnese Helms Haury Program in environment and Social Justice. October 2017, \$600,000 (**Finalist**)

PI, Faculty Seed Grant University of Arizona, 2017, Solar- nanofiltration for off-the grid water purification and treatment of “hard” waters, \$10,000 (**Awarded**)

Faculty Fellow for Agnese Nelms Haury Program in Environment and Social Justice, 2017, \$80,000 (**Awarded**)

PEER-REVIEWED PUBLICATIONS | h-index: 9; total citations: 421

1. Borovik, A., **Karanikola, V.**, Zucker, I., (2020). Platform selection of engineered nanomaterials for water decontamination applications. Environ. Sci.: Nano. DOI: 10.1039/D0EN00786B
2. Shaulsky, E., Wang, Z., Deshmukh, A., **Karanikola, V.**, Elimelech M. (2020). Membrane distillation assisted by heat pump for improved desalination energy efficiency. Desalination. DOI: 10.1016/j.desal.2020.114694
3. **Karanikola, V.**, Moore, S., Deshmukh, A., Arnold, R., Elimelech, M., Sáez, E. (2019). Economic performance of membrane distillation configurations in optimal solar thermal desalination systems. Desalination. DOI: 10.1016/j.desal.2019.114164
4. Dizge, N., Shaulsky, E., **Karanikola V.** (2019). Electrospun cellulose nanofibers for superhydrophobic and oleophobic membranes. J. Membr DOI: 10.1016/j.memsci.2019.117271
5. **Karanikola, V.**, Boo, C., Rolf, J., Elimelech, M. (2018). Engineered Slippery Surface to Mitigate Gypsum Scaling in Membrane Distillation for Treatment of Hypersaline Industrial Wastewaters. Environmental Science & Technology. DOI: 10.1021/acs.est.8b04836
6. Shaulsky, E., **Karanikola, V.**, Straub, A. P., Deshmukh, A., Zucker, I., Elimelech M. (2018). Asymmetric Membranes for Membrane Distillation and Thermo-Osmotic Energy Conversion. Desalination. DOI: 10.1016/j.desal.2018.11.005
7. Moore, S., Ma, L., Potzler, M., Bish, J., **Karanikola, V.**, Prevatt, J., Arnold, R. G., Sáez, A. E. (2018) Sustainable Struvite Control Using Carbon Dioxide from Anaerobic Digester Gas. Journal of Environmental Engineering. DOI: 10.1061/(ASCE)EE.1943-7870.0001466.
8. Li, M., **Karanikola, V.**, Zhang, X., Wang, L., Elimelech, M. (2018). A Self-standing, Support-Free Membrane for Forward Osmosis with No Internal Concentration Polarization. Environmental Science & Technology Letters. DOI: 10.1021/acs.estlett.8b00117

9. Deshmukh A., Boo C., **Karanikola V.**, Lin S., Straub A. P., Tong T., Warsinger D. M., Elimelech M., (2018) Membrane Distillation at the Water-Energy Nexus: Limits, Opportunities, and Challenges. *Energy Environ. Sci.*, DOI:10.1039/C8EE00291F.
10. Moore S., Mirchandani S., **Karanikola V.**, Nenoff T., Arnold R., Saez E. (2018) Process modeling for economic optimization of a solar driven sweeping gas membrane distillation desalination system. *Desalination* 437, 108-120. DOI: 10.1016/j.desal.2018.03.005
11. Snyder K. Corral, A.F., Woods G.J., Prichard, A., **Karanikola, V.*** (2017) Challenges and Lessons Learned from a Sanitation Project in Rural Bolivia. *J. Development in Practice*. DOI: 10.1080/09614524.2018.1481198
12. **Karanikola, V.**, Corral, A.F., Jiang, H., Sáez A.E., Ela, W.P., Arnold, R.G. (2017). Effects of membrane structure and operational variables on membrane distillation performance. *J. Membr. Sci.* DOI: 10.1016/j.memsci.2016.11.038
13. **Karanikola, V.**, Corral, A.F., Jiang, H., Sáez A.E., Ela, W.P., Arnold, R.G. (2015). Sweeping Gas Membrane Distillation: Numerical Simulations of mass and heat transfer through a Hollow Fiber Membrane Contactor. *J. Membr. Sci.* 483, 15–24. DOI 10.1016/j.memsci.2015.02.010
14. **Karanikola, V.**, Corral, A.F., Mette, P., Jiang, H., Arnold, R.G., Ela, W.P. (2014). Solar Membrane Distillation: Desalination for The Navajo Nation. *Reviews in Environmental Health*, 15. DOI: 10.1515/reveh-2014-0019.
15. **Karanikola, V.**, Ngo, A.T., and Valdes J.R. (2011). Plankton filtration with compressible crumb rubber packs. *Chemosphere* 82(4), 597-602. DOI: 10.1016/j.chemosphere.2010.10.098

CONFERENCES AND PRESENTATIONS (selected)

Karanikola, V., Boo, C., Rolf, J., Elimelech, M. 2018. **Engineered Slippery Surface to Mitigate Gypsum Scaling in Membrane Distillation for Treatment of Hypersaline Industrial Wastewaters.** Gordon Research Conference, Membranes, August 2018.

Sarah E. Moore and **Karanikola V.**, 2017, “**What makes Development Successful? A comparison of two communities using anthropological data**”. Engineers Without Borders National Conference, Milwaukee, WI, October 2017

Karanikola V., 2017, **Solar Nanofiltration for Off-the-grid Groundwater treatment in The Navajo Nation**, AEESP 2017, Advancing Healthy Communities, University of Michigan, Ann Harbor.

Karanikola V., Rojas I., 2017, **Solar Nanofiltration for Off-the-grid Groundwater treatment in The Navajo Nation**, AZ Water Annual 2017 Conference, AZ, USA Phoenix, AZ.

Karanikola V., 2016, **Lessons learned and Red flags from Sanitation project in Bolivia**”. AZ Water Annual 2016 Conference, Glendale, AZ, USA Phoenix, AZ

Karanikola V., 2015, “**Lessons learned and Red flags from Sanitation project in Bolivia**”. Regional Engineers Without Borders Conference, Phoenix, AZ

Karanikola V., Corral A.F., Jiang H., Sáez A. E., Ela W. P., and Arnold R. G. 2015, “**Sweeping Gas Membrane Distillation: Through Flat Sheet Membrane Contactor**”. 19th Annual Water Reuse & Desalination Research Conference, Huntington Beach, CA

Karanikola V., Corral A.F., Jiang H., Sáez A. E., Ela W. P., and Arnold R. G. 2015, “**Sweeping Gas Membrane Distillation: Numerical Simulations of Hollow Fiber Membrane Contactor**”. 2015 Membrane Technology Conference Proceedings; American Water Works Association. Orlando, FL. Available from AWWA store.

Karanikola V., Corral A. F., Jiang H., Mette P., Barnhart A., Arnold R. G., and Ela W. P., 2014. “**Solar Membrane Distillation: An Alternative for Desalination in Remote Areas**”. 2014 AZ Water Research Workshop, Salt River Project, Tempe, AZ, Jan. 15

Karanikola V., Corral A. F., Mette P., Jiang H., Arnold R. G., and Ela W. P., September 2013." **Solar Membrane Distillation: Potential for Water Purification in Northern Arizona and W.**

Australia", 15th International Conference of the Pacific Basin Consortium for Environment and Health Workshop, 2013, Honolulu, HI, USA.

Karanikola V., Corral A. F., Mette P., Jiang H., Arnold R. G., and Ela W. P., September 2013." **Solar Membrane Distillation: Desalination for the Navajo Nation**", 15th International Conference of the Pacific Basin Consortium for Environment and Health, 2013, Honolulu, HI, USA.

Karanikola V., Corral, A.F., Mette, P. Arnold R. and Ela W., May 2013. "**Vacuum Membrane Distillation**", AZ Water Annual 2013 Conference, Glendale, AZ, USA.

Karanikola V., Corral A., Jiang H., Messina C., Munich C., Moravec B., Shroads A. Arnold R. and Ela W., May 2012. "**Solar Membrane Distillation**", AZ Water Annual 2012 Conference, Glendale, AZ, USA.

Karanikola V., Corral A., Jiang H., Messina C., Munich C., Moravec B., Shroads A. Arnold R. and Ela W., 2011. "**Solar Membrane Distillation**". New Mexico Water Resources Research Institute, Dec. 12-13.

Corral, A., **Karanikola V.**, Mette P., Arnold R. and Ela W., 2012. "**Solar Membrane Distillation: An Alternative for Desalination in Remote Areas**". 20th Annual Student Showcase. University of Arizona, Nov. 9. (**BIO5 Innovator Award**) (Poster Presentation)

Corral A., **Karanikola V.**, Jiang H., Messina C., Munich C., Moravec B., Shroads A., Arnold R. and Ela W., 2011. "**Solar Membrane Distillation**". 19th Annual Student Showcase. University of Arizona, Nov. 4. (**1st Place & Honorable Mention President's Award**). (Poster Presentation)

INVITED SEMINARS

- 2020 University of Arizona, College of Engineering invited webinar
- 2020 University of Arizona, Energy Talks for Institute for Energy Solutions
- 2019 University of Arizona, Department of Chemical and Environmental Engineering
- 2019 University of Texas, San Antonio, Biomedical and Chemical Engineering
- 2018 New Jersey Institute of Technology, Civil and Environmental Engineering
- 2017 University of Riverside, Mechanical Engineering Department
- 2017 University of Riverside, Chemical and Environmental Engineering Department
- 2017 University of Rhode Island, Department of Civil and Environmental Engineering
- 2016 University of Arizona, Department of Aerospace and Mechanical Engineering
- 2016 University of Arizona, Department of Chemical and Environmental Engineering
- Westland Resources Consulting, desalination training seminar
- 2016 Southern Arizona Environmental Management Society Inc
- 2015 Southern Arizona, AZ water luncheon

SYNERGISTIC ACTIVITIES

- 2020 National Science Foundation Reviewer - Interfaces
- North American Membrane Society (NAMS)- Session Chair, 2020
- Gordon Research Conference on Membranes: Materials and Processes- Session Co-Chair, 2018
- 2016 National Science Foundation Reviewer - Membranes
- Faculty Advisor for Engineers Without Borders-USA, University of Arizona Chapter 2016 - present
- Faculty Advisor for Association of Chemical and Environmental Engineering Graduate Students, University of Arizona 2019 - present

AWARDS

- 2020 Provost Early Career Scholar Awardee
- 2017 Faculty Fellow for Agnese Nelms Haury Program in Environment and Social Justice
- 2016 WPI STEM Faculty launch fellowship
- 2015 Engineers Without Borders Premier Chapter of Mountain Region (lead the application)

- 2015 Travel Awards from Institute of Environment and Graduate and Professional Student Council of University of Arizona
- 2015 AZ Water Association Best Conference Abstract
- 2014 Outstanding Teaching Assistant, UA College of Engineering
- 2014 ASUA Project Leader of the year, University of Arizona
- 2013 Stewart Environmental Consultants Scholarship
- 2013 AZ Water Scholarship 3rd Place
- 2012-2013 Southern Arizona Environmental Management Society (SAEMS) Scholarship
- 2012 Alliance Hazardous Materials Professionals Thunderbird Chapter Scholarship
- 2012 WateReuse AZ Scholarship
- 2011-2015 Engineering Graduate Tuition Scholarship

ON THE NEWS

- <https://news.engineering.arizona.edu/news/provost-recognizes-three-engineers>
- <https://uaatwork.arizona.edu/lqp/awards-honor-best-teaching-research-and-mentorship>
- <https://energy.arizona.edu/news/2020/05/dr-vicky-karanikola-named-early-career-scholar>
- https://tucson.com/news/local/ua-groups-help-effort-to-create-community-farm-on-san-carlos-apache-reservation/article_2cd87b26-179b-526b-b476-8353fe18b346.html
- <https://chee.engineering.arizona.edu/news-events/research-professor-karanikola-helps-bring-life-source-san-carlos-apache-community>
- https://tucson.com/news/local/ua-team-builds-desalination-plants-for-water-scarce-navajo-reservation/article_873e7e88-668f-5081-801f-54020137d567.html

PROFESSIONAL AFFILIATIONS

- North American Membrane Society (NAMS)
- Engineers Without Borders –USA (EWB-USA)
- American Water Works Association (AWWA)
- Association of Environmental Engineering and Science Professors (AEESP)
- Society of Women Engineers (SWE)
- American Society for Engineering Education (ASEE)
- AZ water member

TEAMWORK OPPORTUNITIES AND VOLUNTEERING

- Volunteer for Household Hazardous Waste Management for the City of Tucson
- Director of Fundraising committee of Engineers Without Borders, University of Arizona
- Member of EWB, Engineers Without Borders in San Diego State University and University of Arizona
- Founding Member of the Association of Chemical and Environmental Engineers, The University of Arizona
- Coached and managed the athletic team of Hellenic Alpine Ski Club of Thessaloniki
- Summer Camp group leader for YMCA