
SIDY NDAO

Founder & President

Dakar American University of Science & Technology
Director of the Nano & Microsystems Research Center

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Professional Appointments & Activities

President of the Dakar American University of Science & Technology	2021 – Present
Associate Professor (Tenured) in the Dept. of Mechanical and Materials Engineering, University of Nebraska-Lincoln (Research Lab: http://nmrl.unl.edu)	2018 – 2021
Assistant Professor in the Dept. of Mechanical and Materials Engineering, University of Nebraska-Lincoln	2012 – 2018
World Bank Expert (https://bit.ly/2VOuV47)	2017 – Present
Founder of SenEcole – Capacity Building for an Emerging Africa (http://senecole.com)	2008 – Present
Founder of the Pan-African Robotics Competition (http://parcrobotics.org)	2015 – Present
Founder of the Dakar American University of Science & Technology (http://daust.org)	2016 – Present
Founder of CAYTU Research & Development	2021 – Present

Education

Massachusetts Institute of Technology (MIT) Postdoctoral Associate Dept. of Chemical Engineering, MIT Institute for Soldier Nanotechnology	Cambridge, MA 2011 - 2012
Rensselaer Polytechnic Institute Ph.D., Mechanical Engineering	Troy, NY December 2010
The City College of New York M.E., Mechanical Engineering	New York City, NY August 2007
The City College of New York B.E., Mechanical Engineering	New York City, NY May 2005

Publications & Invited Talks

INVITED TALKS

1. **Young Scientist Laureate**, “Heat Information” World Laureate Forum, Shanghai, China, Oct. 30 - Nov. 1, 2020

CV updated: 8/3/2021

2. **Invited Panelist**, “Digital Competence and Human Capital” World Bank sponsored event, Djibouti, November 14-15, 2018
3. **Invited Panelist**, “Educate, Innovate, and Make: A Recipe for Sustainable Growth in African Countries” Djibouti, September 26, 2018
4. **Keynote Speaker**, “High Temperature NanoThermoMechanical Computing” 3rd Thermal and Fluids Engineering Conference in Ft. Lauderdale, March 4-7, 2018
5. **Invited Panelist**, “State of the Africa Region: Skills for Success in a Transforming Africa,” World Bank–IMF Annual and Spring Meetings, Washington DC, October 14, 2017
6. “Can Africa Rise without Research-based Innovation?” African Institute of Mathematical Sciences, Kigali, Rwanda, September 2017
7. “Controlling Heat Flow at the Micro & Nanoscale: Application in Thermal Management and Thermal Computing,” King Abdullah University of Science and Technology, Saudi Arabia, April 2017
8. “Near-Field Thermal Radiation for Solar Thermophotovoltaics and High Temperature Thermal Logic and Memory Applications,” NEBRASKA MRSEC Symposium, March 2017
9. “Two-Phase Heat Transfer from Self-Assembled Multiscale Metallic Surfaces,” NASA Glenn Research Center, Cleveland, Ohio, November 2014
10. **Keynote Speaker**, “State-of-the-Art of Functionalized Micro/Nano Engineered Two-phase Heat Transfer Surfaces,” 12th International Conference on Nanochannels, microchannels, and Minichannels, Chicago, Illinois, August 2014
11. “Nano/Microsystems: Energy and Biomedical Applications”, Regenerative Medicine, University of Nebraska Medical Center (UNMC), Omaha, NE, February 2013.

JOURNAL PUBLICATIONS

1. Hamed, A., **Ndao, S.**, “NanoThermoMechanical AND and OR Logic Gates,” *Nature Scientific Reports*, 10, 2437, 2020
2. Hamed, A., **Ndao, S.**, “Non-linear Displacement Mechanisms of Thermally Actuated MEMS Chevron,” *Journal of Microelectromechanical Systems*, 29(2), 255-259, 2020
3. Jaber, A., Esfahani, A. M., Aghabaglou, F., Park, J. S., **Ndao, S.**, Tamayol, A., Yang, R., “Microfluidic Systems with Embedded Cell Culture Chambers for High Throughput Biological Assays,” *ACS Applied Materials & Interfaces*, ACS Appl. Bio Mater, 3, 10, 6661–6671, 2020
4. Elzouka, M., **Ndao, S.**, “Enhanced Thermal Radiation via Interweaved L Slots,” *Optics Express*, 27(6), 353405, 2019
5. Hamed, A., Elzouka, M., **Ndao, S.**, “Thermal Calculator,” *International Journal of Heat and Mass Transfer*, 134, 359-365, 2019
6. Kruse, C., Tsubaki, A., Zuhlke, C., Alexander, D., Peng, E., Shield, J., **Ndao, S.**, Gogos, G., “Influence of Copper Oxide on Femtosecond Laser Surface Processed Copper Pool Boiling Heat Transfer Surfaces” *Journal of Heat Transfer*, 141, 051503, 2019

7. Hamed, A., **Ndao, S.**, "High Anisotropy Metamaterial Heat Spreader," *International Journal of Heat and Mass Transfer*, 121, 10-14, 2018
8. Elzouka, M., **Ndao, S.**, "Meshed Doped Silicon Photonic Crystals for Manipulating Near-Field Thermal Radiation," *Journal of Quantitative Spectroscopy & Radiative Transfer*, 204, 56-62, 2018
9. Kruse, C., Lucis, M., Shield, J., Anderson, T., Zuhlke, C., Alexander, D., Gogos, G., **Ndao, S.**, "Effects of Femtosecond Laser Surface Processed Self-Organized Nanoparticles on Pool Boiling Heat Transfer Performance," *Applied Thermal Engineering*, 10(3), 031009, 2018
10. Elzouka, M., **Ndao, S.**, "High Temperature Near-Field NanoThermoMechanical Rectification," *Nature Scientific Reports*, 7, 44901, 2017
11. Davis, E., Liu, Y., Jiang, L., Lu, Y., **Ndao, S.**, "Wetting Characteristics of 3-Dimensional Nanostructured Fractal Surfaces," *Applied Surface Science*, 392, 929–935, 2017
12. Davis, E., **Ndao, S.**, "On the Wetting States of Low Melting Point Metal Galinstan® on Silicon Microstructured Surfaces," *Advanced Engineering Materials*, 1700829, 2017
13. Kruse, C., Tsubaki, A., Zuhlke, C., Anderson, T., Alexander, D., Gogos, G., **Ndao, S.**, "Secondary Pool Boiling Effects," *Applied Physics Letters*, 108(5), 051602, 2016
14. Hassebrook, A., Kruse, C., Wilson, C., Anderson, T., Zuhlke, C., Alexander, D., Gogos, G., **Ndao, S.**, "Effects of Droplet Diameter and Fluid Properties on the Leidenfrost Temperature of Polished and Micro/Nanostructured Surfaces," *Journal of Heat Transfer*, 138(5), 051501, 2016
15. Ems, H., **Ndao, S.**, "Microstructure-alone induced transition from hydrophilic to hydrophobic wetting state on Silicon," *Applied Surface Science*, 339, pp. 137–143, 2015
16. Kruse, C., Somanas, I., Anderson, T., Wilson, C., Zuhlke, C., Alexander, D., Gogos, G., **Ndao, S.**, "Self-Propelled Droplets on Heated Surfaces with Angled Self-Assembled Micro/Nanostructures," *Microfluidics and Nanofluidics*, 18 (5), pp 1417-1424, 2015
17. Elzouka, M., **Ndao, S.**, "Towards A Near-Field Concentrated Solar Thermophotovoltaic Microsystem: Part I - Modeling," *Solar Energy*, 2015
18. Kruse, C., Wilson, C., Anderson, T., Zuhlke, C., Alexander, D., Gogos, G., **Ndao, S.**, "Enhanced Pool-Boiling Heat Transfer and Critical Heat Flux on Femtosecond Laser Processed Stainless Steel Surfaces," *International Journal of Heat and Mass Transfer*, 82, pp. 109–116, 2015
19. Elzouka, M., **Ndao, S.**, "Near-Field NanoThermoMechanical Memory," *Applied Physics Letters*, 105, 243510, 2014
20. **Ndao, S.**, Peles, Y., and Jensen, M. K., "Micro device design and fabrication for the experimental investigation of jet impingement on an array of micro pin fins," *Journal of Micromechanics and Microengineering*, 24 105005, 2014
21. **Ndao, S.**, Peles, Y., and Jensen, M. K., "Effects of pin fin shape and configuration on the single-phase heat transfer characteristics of jet impingement on micro pin fins," *International Journal of Heat and Mass Transfer*, 70, pp. 856-863, 2014
22. Kruse, C., Anderson, T., Wilson, C., Zuhlke, C., Alexander, D., Gogos, G., **Ndao, S.**, "Extraordinary Shifts of the Leidenfrost Temperature from Multiscale Micro/Nanostructured Surfaces," *Langmuir*, 29

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- (31), pp 9798–9806, 2013
23. **Ndao, S.**, Jensen, K. F., Velmahos, G., King, D. R., "Design and demonstration of a battery-less fluid warmer for combat", *Journal of Special Operations Medicine*, 13 (3), pp. 31-5, 2013
 24. Rinnerbauer, V. **Ndao, S.**, Yeng, Y. X., Bermel, P., Senkevich, J., Jensen K. F., Joannopoulos, J. D., Soljačić, M., and Celanovic, I., "Large-area fabrication of high aspect ratio tantalum photonic crystals for high-temperature selective emitters," *Journal of Vacuum Science & Technology B*, 31, 011802, 2013
 25. Rinnerbauer, V., **Ndao, S.**, Yeng, Y. X., Bermel, P., Senkevich, J., Celanovic, I., and Soljačić, M., "Recent developments in high-temperature photonic crystals," *Energy Environmental Science*, 5 (10), pp. 8815 – 8823, 2012
 26. **Ndao, S.**, Peles, Y., and Jensen, M. K., "Experimental investigation of flow boiling heat transfer of jet impingement on smooth and micro structured surfaces," *International Journal of Heat and Mass Transfer*, 55(19-20), pp. 5093–5101, 2012
 27. **Ndao, S.**, Lee, H. J., Peles, Y., and Jensen, M. K., "Heat transfer enhancement from micro pin fins subjected to an impinging jet," *International Journal of Heat and Mass Transfer*, 55(1-3), pp. 413-421, 2012
 28. Basu S., **Ndao S.**, Michna G. J., Peles Y., and Jensen M. K., "Flow boiling of R134a in circular microtubes. Part II: study of critical heat flux condition," *Journal of Heat Transfer*, 133(5), 051503, 2011
 29. Basu S., **Ndao S.**, Michna G.J., Peles Y., and Jensen M. K., "Flow boiling of R134a in circular microtubes. Part I: study of heat transfer characteristics," *Journal of Heat Transfer*, 133(5), 051502, 2011
 30. **Ndao, S.**, Peles, Y., and Jensen M. K., "Multi-objective thermal design optimization and comparative analysis of electronics cooling technologies," *International Journal of Heat and Mass Transfer*, 52(19-20), pp. 4317-4326, 2009

Selected Research Grants

- "NSF ST Center for Infrared-driven Intense-field Science (IRIS)", National Science Foundation, Co-PI, \$1,150,000, Submitted, 2020
- "NETTALIS: Nano Encoding Technology for the Tracking of informAtion in LiquId Samples," Grand Challenge Africa / IPD, \$25,000, 04/02/2018 - 09/30/2019
- "Contaminant Sensing and Field Platform," IntelliFarm, \$201,657, PI, 01/01/2018 – 06/30/2019
- "BioTransBank: A Combined Digital Platform and Smart Devices for Bio-sample Transportation and Banking," Grand Challenge Africa / IPD, \$49,734, PI, 10/01/2017 - 03/31/2019
- "Boiling Heat Transfer on Femtosecond Laser Fabricated Micro/Nano Structured Surfaces," NASA, \$278,028, PI, 08/01/2014 - 07/31/2018
- "NanoThermoMechanical Thermal Computing: NanoPhotonics Metamaterials for High Temperature Memories and Logic Devices," NSF/MRSEC, \$100,000, PI, 11/01/2016 – 10/31/2018
- "NanoFins Heat Exchanger," NASA, \$35,000, PI, 10/01/2016 – 09/30/2017

- “Functionalized Metallic Surfaces for Enhanced Heat Transfer, Drag Reduction, and Novel Power Sources,” ONR, \$652,407, Co-PI, 3/1/15 - 3/31/2017
- “Metallic Biomimetic Micro/Nano Structured Metallic Surcaces by Femtosecond Laser Surface Processing for Thermal Management Systems” NASA EPSCoR, \$750,000, Co-PI, 8/1/2014 - 7/31/2017
- “Numerical Modeling of the Formation of Micro/ Nanostructures on Metals using Femtosecond Laser Surface Processing,” Nebraska Center for Energy Sciences Research (NCESR), \$250,000, Co-PI, 1/1/2014 - 12/31/2015
- “Near-Field (Nano-Gap) Concentrated Solar Thermophotovoltaic Microsystem for Space and Earth Observation Measurements,” NASA EPSCoR, \$62,621, PI, 9/1/2014 - 11/30/2015
- “Near-Field (Nano-Gap) Concentrated Solar Thermophotovoltaic Microsystem,” Nebraska Center for Energy Sciences Research (NCESR), \$120,000, PI, 1/1/2013 - 12/31/2014
- “Enhancement and Optimization of Bubble Production During Nucleate Boiling Using Multiscale Structures Fabricated by Femtosecond Laser Surface Processing: Numerical Simulations and Experiments”, NASA EPSCoR, \$40,000, Co-PI, 9/1/2013-5/31/2014

Patents

- **Ndao, S.**, Gogos, G., Alexander, D., Anderson, T. and Zuhlke, C., “Leidenfrost Droplet Microfluidics,” US10792660B1
- Anderson, T., **Ndao, S.**, Zuhlke, C., Alexander, D. and Gogos, G., " Control of Change of Phase Through Physical Surface Shaping," U.S. Patent Application No. 14/595,452
- **Ndao, S.**, Elzouka, M., "Near-Field Heat Transfer Enabled Nanothermomechanical Memory and Logic Devices," U.S. US10020010B1
- Rinnerbauer, V. **Ndao, S.**, Yeng, Y. X., Bermel, P., Senkevich, J., Jensen K. F., Joannopoulos, J. D., Soljačić, M., and Celanovic, I., Photonic Crystals Comprising Polycrystalline Refractory Metals and/or Alloys and Associated Methods, 2012.
- **Ndao, S.**, Gogos, G., Alexander, D., Anderson, T. and Zuhlke, C., Entitled “Monolithic Hierarchical Structures Micro Heat Pipe (MHS μ HP),” US10267567B1
- Sall, A. A., Diagne, C. T., **Ndao, S.**, “Microsystem Label for Sample Tubes” submitted 11/13/2017, pending.

Teaching Experience & AWARDS

COURSES

- MEMS/NEMS Fabrication and Microfluidics
- Heat Transfer
- Micro and Nanoscale Thermal-Fluids Science and Engineering

AWARDS

- World Laureate Young Scientist, 2020
- Next Einstein Fellow, 2018-2020
- World Economic Forum Young Scientist, 2018
- Henry Y. Kleinkauf Family Distinguished New Faculty Teaching Award, 2016

Thesis Advisor and Postgraduate-Scholar Sponsor

- Ian Tsukada, Graduate student (MS), MME, UNL
- Yong Chul Yoo, Graduate student (PhD), MME, UNL (Alumni)
- Ahmed Hamed, Graduate student (PhD), MME, UNL (Defended thesis 2019)
- Henry Ems, Graduate student (PhD), MME, UNL (Alumni)
- Corey Kruse, Graduate student (PhD), MME, UNL (Defended thesis 2018)
- Mahmoud Elzouka, Graduate student (PhD), MME, UNL (Defended thesis 2017)
- Ethan Davis, Graduate student (MS), MME, UNL (Defended thesis 2017)
- Anton Hassebrook, Graduate student (MS), MME, UNL (Defended thesis 2017)
- Sarah Wallis, Graduate student (MS), MME, UNL (Defended thesis 2017)
- Justin Costa Greger, Graduate student (MS), MME, UNL (Alumni)
- Mark Anderson, Graduate student (MS), MME, UNL (Alumni)
- Isra Somanas, Graduate student (MS), MME, UNL (Alumni)
- Mukesh Kulsreshath, Postdoctoral associate, MME, UNL (Alumni)

Selected Internal & External Professional Services

- Faculty advisor, National Society of Black Engineers, UNL Student chapter.
- Member of the Mechanical & Materials Engineering Department Undergraduate Curriculum Committee
- Member of the executive committee (seven members) to oversee the operation of UNL's \$3.5M NSF awarded Nebraska Nanoscience Facility.
- Panel reviewer for the National Science Foundation, Department of Energy Building Technologies Office, and ARPA-E
- Discussion Leader on “Solid-Liquid Phase Change,” Gordon Research Conference - Micro and Nanoscale Phase Change Heat Transfer, Lucca (Barga), IT , February 3 - 8, 2019
- Session Co-Chair, thermals for Heterogeneous Integration, ASME InterPACK, 2017, San Francisco, CA
- Topic organizer (Area: Thermal Management - Jet & Spray Cooling), ASME InterPACK / ICNMM 2015 conference, San Francisco, CA
- Member of the Regional Scientific Committee of USA, Mexico and Central America and Associate Editor of the Proceedings for the 15th International Heat Transfer Conference
- Chair of session on “Thermal Characterization Methods”, 2014 IEEE Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm), Orlando, FL
- UNL’s Nebraska Center for Materials and Nanoscience NanoFab Cleanroom committee
- Journal reviewer (American Chemical Society - ACS Nano, Langmuir, ASME Journal of Electronic Packaging, International Journal of Heat and Mass Transfer, IJHMT, Journal of Applied Thermal Engineering, International Journal of Heat and Fluid Flow, Journal of Thermal Science and Engineering Applications)