

Alina D. LaPotin

Ph.D. Candidate
Department of Mechanical Engineering
Massachusetts Institute of Technology
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EDUCATION

- Ph.D., Mechanical Engineering** Dec. 2022 (Expected)
Massachusetts Institute of Technology, Cambridge, MA
Major: Thermofluids (GPA: 4.9/5.0)
Minor: Energy and climate policy
Advisor: Dr. Asegun Henry
- M.S., Mechanical Engineering** Sept. 2017 – Sept. 2019
Massachusetts Institute of Technology, Cambridge, MA
Thesis: Multi-stage adsorption-based atmospheric water harvesting
Advisor: Dr. Evelyn N. Wang
- B.S., Mechanical Engineering** Aug. 2012 – May 2016
The University of Texas at Austin, Austin, TX
High Honors (GPA: 3.93/4.0)
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RESEARCH AND INDUSTRY EXPERIENCE

- Massachusetts Institute of Technology** Cambridge, MA
Graduate Research Assistant Sept. 2017 – present
- (Ph.D.) Developing technologies which enable a high-temperature thermal energy storage system for grid-scale applications.
 - Developing apparatus to measure efficiency and power output of thermophotovoltaics when exposed to a 2150°C blackbody emitter.
 - (M.S.) Designed and tested a prototype for a new solar-driven atmospheric water harvesting device which uses adsorbents to enable water production in off-grid, arid environments.
 - Demonstrated greater water productivity and efficiency than prior designs by using latent heat recovery strategy.
 - Characterized adsorbents and performed multi-physics modeling to optimize prototype.
- The University of Texas at Austin** Austin, TX
- Undergraduate Research Assistant, Nuclear Engineering Teaching Lab Jan. 2015 – Mar. 2017
- Developed techno-economic model of a thermal energy storage system for nuclear power plants.
- Undergraduate Research Assistant, Geotechnical Engineering Dec. 2013 – Aug. 2014
- Tested shear properties of soil for development of offshore wind turbine anchor system.

Firefly Space Systems

Austin, TX

Intern, Stage Systems Group

Aug. 2016 – Oct. 2016

- Led design of thermal-fluid components through hardware development process.

General Electric

Plainville, CT

Intern, Energy Management Division

May 2015 – Aug. 2015

- Created CAD parts and assemblies for commercial high-amperage circuit breakers.

HDR

Austin, TX

Intern, Water and Wastewater Group

May 2013 – Aug. 2013

- Improved electronic manuals for water treatment plant operation.

PUBLICATIONS

LaPotin, A., Schulte, K.L., Steiner, M.A., Buznitsky, K., Kelsall, C.C., Friedman, D.J., Tervo, E.J., France, R.M., Young, M.A., Rohskopf, A., Verma, S.K., Wang, E.N., Henry, A. (2022). Thermophotovoltaic efficiency of 40%. *Nature* (In Press).

Amy, C., Pishahang, M., Kelsall, C., **LaPotin, A.**, Brankovic, S., Yee, S., Henry, A. (2022). Thermal energy grid storage: liquid containment and pumping above 2000°C. *Applied Energy*, 308, 118081.

Amy, C., Pishahang, M., Kelsall, C., **LaPotin, A.**, Henry, A. (2021). High-temperature pumping of silicon for thermal energy grid storage. *Energy*, 233, 121105.

LaPotin, A., Zhong, Y., Zhang, L., Leroy, A., Kim, H., Rao, S.R., and Wang, E.N. (2021). Dual-Stage atmospheric water harvesting device for scalable solar-driven water production. *Joule*, 5(1), 166-182.

Amy, C., Kelsall, C.C., **LaPotin, A.**, Pishahang, M., and Henry, A. (2021). Chapter 3: Ultra-high temperature sensible heat storage and heat transfer fluids. In *Ultra-high Temperature Thermal Energy Storage, Transfer and Conversion* (pp. 57-84). Woodhead Publishing.

Kim, H., Rao, S. R., **LaPotin, A.**, Lee, S., & Wang, E. N. (2020). Thermodynamic analysis and optimization of adsorption-based atmospheric water harvesting. *International Journal of Heat and Mass Transfer*, 161, 120253.

Schulte, K. L., France, R. M., Friedman, D. J., **LaPotin, A.**, Henry, A., & Steiner, M. A. (2020). Inverted metamorphic AlGaInAs/GaInAs tandem thermophotovoltaic cell designed for thermal energy grid storage application. *Journal of Applied Physics*, 128(14), 143103.

LaPotin, A., Kim, H., Rao, S. R., & Wang, E. N. (2019). Adsorption-based atmospheric water harvesting: Impact of material and component properties on system-level performance. *Accounts of chemical research*, 52(6), 1588-1597.

Rao, S., **LaPotin, A.**, Kim, H. K. H., & Wang, E. (2019). Understanding material and component level properties on the performance of MOF-based atmospheric water harvesting systems. *Abstracts of papers of the American Chemical Society* (Vol. 258).

Rieth, A. J., Wright, A. M., Rao, S., Kim, H., **LaPotin, A.**, Wang, E. N., & Dincă, M. (2018). Tunable metal–organic frameworks enable high-efficiency cascaded adsorption heat pumps. *Journal of the American Chemical Society*, 140(50), 17591-17596.

Bisett, S., **LaPotin, A.**, and Schneider, E. (2017). Steam accumulator storage integration into a nuclear power plant. *American Nuclear Society Transactions* 116(1), 874-877.

LaPotin, A., and Schneider, E. (2016). An Economic Model of a Steam Accumulator Storage System for Nuclear Power Plants. *American Nuclear Society Transactions*, 115(1), 959-962.

AWARDS AND HONORS

Martin Family Society of Fellows for Sustainability, MIT	2021 – 2022
Certificate in Nuclear and Radiation Engineering, UT Austin	2016
Engineering Honors Program, UT Austin	2012 – 2016
C.W. Besser Memorial Endowed Presidential Scholarship, UT Austin	2015
Alma and Leonard Orth Endowed Scholarship, UT Austin	2013
Robert M. Leibrock Friend of Alec Excellence Fund Scholarship, UT Austin	2012

PRESENTATIONS

MIT Energy Night 2020 (Cambridge, MA, Oct. 23, 2020)

- *Poster*: Thermal Energy Grid Storage

Materials Research Society (MRS) Conference Spring (Phoenix, AZ, April 2019)

- *Talk*: Atmospheric water harvesting with composite AQSOA zeolite layers

MIT Energy Night 2019 (Cambridge, MA, Oct. 11, 2019)

- *Poster*: Thermal Energy Grid Storage using multi-junction photovoltaics

Annual J-WAFS Research Workshop (Cambridge, MA, Sept. 18, 2019)

- *Talk*: Distributed water harvesting from air in water-stress and remote areas using metal-organic frameworks
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OTHER PROJECTS

MIT Radiative Transfer Feb. 2020 – May 2020

- Developed optical model of reflectance of tandem thermophotovoltaic cell and proposed cell modifications to improve the reflectance to achieve an efficiency of 50%.

MIT Advanced Energy Conversion Feb. 2019 – May 2019

- Proposed a novel configuration for a combined compressed air and thermal energy storage system which uses a CO₂ Brayton cycle run between hot and cold storage to achieve higher round trip efficiency than conventional adiabatic compressed air energy storage systems.
- Performed thermodynamic first and second law techno-economic analysis to evaluate system performance.

MIT Medical Device Design Sept. 2018 – Dec. 2018

- Design, analysis, and fabrication of prototype of a portable sit-to-stand device for older adults.
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PATENT APPLICATION

Wang, E. N., **LaPotin, A.**, Zhong, Y. (2020). Multi-stage adsorption-based atmospheric water harvesting. *U.S. Patent Application No. 17/409,978*. Washington, DC. U.S. Patent and Trademark Office.

SKILLS

Laboratory: Spectroscopy (FTIR, UV/Vis), microscopy (SEM), TGA, machining (waterjet, mill)
Software: Multiphysics modeling (COMSOL), MATLAB, SolidWorks, LabVIEW, Autodesk Inventor
Communication: Grant proposals, technical reports and presentations, manuscript reviewer

SERVICE AND PROFESSIONAL ACTIVITIES

- MIT MechE ENGAGE graduate peer mentor – mentor to first year graduation students, Feb. 2021 – Dec. 2021.
- MIT Makerworkshop mentor and waterjet machine master – Trained MIT engineering students on operation and safety of the waterjet and led waterjet maintenance, Oct. 2018 – Aug. 2020.
- 20.380 Biological Engineering Design – Guest lecture for biological engineering senior design class on the design of an atmospheric water harvesting prototype utilizing adsorbents, March 3, 2020.
- Supervised an MIT student’s undergraduate senior thesis research. Student obtained a B.S. in Mechanical Engineering from MIT in May 2020, Jan. 2020 – May 2020.
- Reviewer of over 10 journal publications for peer reviewed journals including Nature, Nature Energy, and Nature Sustainability.
- Engineers for a Sustainable World UT Austin – organized Alternative Energy Challenge competition and other projects to facilitate student efforts related to sustainability, Aug. 2012 – Dec. 2014