

# Andrea D. Pickel

Assistant Professor

Department of Mechanical Engineering

University of Rochester

219 Hopeman Engineering Building, Rochester, NY 14627

(585) 275-9142 | apickel@ur.rochester.edu | labsites.rochester.edu/pickel

## Education

- May 2019 **University of California, Berkeley** Berkeley, CA  
Ph.D. in Mechanical Engineering  
Advisor: Prof. Chris Dames  
Major: Heat transfer. Minors: Materials science, solid state physics.  
Thesis: "Far-Field Optical Thermometry Techniques for Challenging Environments"
- May 2014 **Carnegie Mellon University** Pittsburgh, PA  
B.S. in Mechanical Engineering with University and College Honors

## Professional Appointments

- 07/19 – present Assistant Professor, Department of Mechanical Engineering, University of Rochester  
Assistant Professor, Materials Science Graduate Program, University of Rochester
- 08/14 – 05/19 Graduate Researcher, Nano/Energy Lab, UC Berkeley
- 01/12 – 05/14 Undergraduate Researcher, McHenry Group, Carnegie Mellon University
- 05/14 – 08/14 Analog Packaging Intern, Texas Instruments, Dallas, TX
- 05/13 – 08/13

## Honors and Awards

- 2024 Scialog Fellow for Automating Chemical Laboratories
- 2023 G. Graydon Curtis '58 and Jane W. Curtis Award for Non-Tenured Faculty Teaching
- 2022 NSF CAREER Award
- 2021 University of Rochester Furth Fund Award
- 2020 American Chemical Society Petroleum Research Fund (ACS PRF) Doctoral New Investigator Award
- 2018 Selected to attend Rising Stars in Mechanical Engineering workshop at MIT
- 2018 Semifinalist, UC Berkeley Grad Slam ("three-minute thesis" speech competition)
- 2018 2<sup>nd</sup> place poster award, Advanced Imaging Methods Workshop, Berkeley, CA
- 2016 – 2019 National Science Foundation (NSF) Graduate Research Fellowship
- 2014 – 2016 UC Berkeley Chancellor's Fellowship (2 years of full funding)
- 2012 – 2014 Semiconductor Research Corporation Undergraduate Research Opportunities Scholar (5 semesters plus 1 summer of research support)
- 2014 2<sup>nd</sup> place, Carnegie Mellon College of Engineering Honors Research Poster Contest
- Tau Beta Pi Engineering Honor Society
- Pi Tau Sigma Mechanical Engineering Honor Society

## Refereed Journal Publications

<sup>†</sup>Denotes corresponding author. <sup>‡</sup>Denotes Pickel lab graduate student. <sup>#</sup>Denotes Pickel lab undergraduate student.

15. Z. Ye<sup>‡</sup>, B. Harrington<sup>‡</sup>, and **A.D. Pickel<sup>†</sup>**, "Optical Super-Resolution Nanothermometry via Stimulated Emission Depletion Imaging of Upconverting Nanoparticles," submitted.
14. B. Harrington<sup>\*‡</sup>, Z. Ye<sup>\*‡</sup>, L. Signor<sup>‡</sup>, and **A.D. Pickel<sup>†</sup>**, "Luminescence Thermometry Beyond the Biological Realm," *ACS Nanoscience Au* **4**, 30-61 (2024). (Invited review article)  
*\* denotes equal contribution to this work*
  - Selected as an ACS Editors' Choice Article
13. D.R. Luntz-Martin, D.K. Bommidi<sup>‡</sup>, K. Zhang, **A.D. Pickel**, and A.N. Vamivakas, "Nanothermometry in Rarefied Gas using Optically Levitated Nanodiamonds," *Optics Express* **31**, 36219-36227 (2023).
12. Z. Ye<sup>‡</sup>, D.K. Bommidi<sup>‡</sup>, and **A.D. Pickel<sup>†</sup>**, "Dual-Mode Operando Raman Spectroscopy and Upconversion Thermometry for Probing Thermal Contributions to Plasmonic Photocatalysis," *Advanced Optical Materials* **11**, 2300824 (2023).
11. C. Jian<sup>#</sup>, Z. Ye<sup>‡</sup>, and **A.D. Pickel<sup>†</sup>**, "Laser heating with doughnut-shaped beams," *Journal of Applied Physics* **132**, 245104 (2022).
10. D.K. Bommidi<sup>‡</sup> and **A.D. Pickel<sup>†</sup>**, "Temperature-dependent excited state lifetimes of nitrogen vacancy centers in individual nanodiamonds," *Applied Physics Letters* **119**, 254103 (2021).
  - Selected as a Featured Article and for a [Scilight \("science highlight"\) perspective article](#)
9. **A.D. Pickel<sup>†</sup>** and C. Dames, "Size and shape effects on the measured peak temperatures of nanoscale hotspots," *Journal of Applied Physics* **128**, 045103 (2020).
8. **A.D. Pickel**, A. Teitelboim, E.M. Chan, N.J. Borys, P.J. Schuck, and C. Dames, "Apparent self-heating of individual upconverting nanoparticle thermometers," *Nature Communications* **9**, 4907 (2018).
7. G. Wehmeyer, **A.D. Pickel**, and C. Dames, "Onsager reciprocity relation for ballistic phonon heat transport in anisotropic thin films of arbitrary orientation," *Physical Review B* **98**, 014304 (2018).
6. T. Li, **A.D. Pickel**, Y. Yao, Y. Chen, Y. Zeng, S.D. Lacey, Y. Li, Y. Wang, J. Dai, Y. Wang, B. Yang, M.S. Fuhrer, A. Marconnet, C. Dames, D.H. Drew, and L. Hu, "Thermoelectric properties and performance of flexible reduced graphene oxide films up to 3000 K," *Nature Energy* **3**, 148-156 (2018).
  - News and Views: [Bring on the heat](#)
5. J.D. Kilbane, E.M. Chan, C. Monachon, N.J. Borys, E.S. Levy, **A.D. Pickel**, J.J. Urban, P.J. Schuck, and C. Dames, "Far-field optical nanothermometry using individual sub-50 nm upconverting nanoparticles," *Nanoscale* **8**, 11611 (2016).
4. W. Bao<sup>\*</sup>, **A.D. Pickel<sup>\*</sup>**, Q. Zhang<sup>\*</sup>, Y. Chen<sup>\*</sup>, Y. Yao<sup>\*</sup>, J. Wan, K. Fu, Y. Wang, J. Dai, H. Zhu, D. Drew, M. Fuhrer, C. Dames, and L. Hu, "Flexible, High Temperature, Planar Lighting with Large Scale Printable Nanocarbon Paper," *Advanced Materials* **28**, 4684-4691 (2016).  
*\* denotes equal contribution to this work*
3. S. Xu, A.H. Habib, **A.D. Pickel**, and M.E. McHenry, "Magnetic Nanoparticle-based Solder Composites for Electronic Packaging Applications," *Progress in Materials Science* **67**, 95-160 (2015).

2. S. Xu, A. Prasitthipayong, **A.D. Pickel**, A.H. Habib, and M.E. McHenry, "Mechanical Properties of FeCo Magnetic Particles-based Sn-Ag-Cu Solder Composites," *Applied Physics Letters* **102**, 251909 (2013).
1. S. Xu, **A.D. Pickel**, A. Prasitthipayong, A.H. Habib, and M.E. McHenry, "Modeling of Localized Reflow in Solder/Magnetic Nanocomposites for Area-Array Packaging," *Journal of Applied Physics* **113**, 17A305 (2013).

## Preprints and Non-Refereed Publications

2. 36 authors including **A.D. Pickel**, "35 challenges in materials science being tackled by PIs under 35(ish) in 2021," *Matter* **4**, 3804-3810 (2021).
1. C.D. Aiello, **A.D. Pickel**, E. Barnard, R.B. Wai, C. Monachon, E. Wong, S. Aloni, F. Ogletree, C. Dames, and N. Ginsberg, "Cathodoluminescence-based nanoscopic thermometry in a lanthanide-doped phosphor," [arXiv:1810.07581](https://arxiv.org/abs/1810.07581) [cond-mat.mes-hall].

## Presentations

### Invited Presentations, Seminars, and Panels

14. "Optical Thermometry Beyond the Diffraction Limit," Princeton University Department of Mechanical and Aerospace Engineering Seminar Series. October 6, 2023.
13. "Optical Thermometry Beyond the Diffraction Limit," *The 10<sup>th</sup> US-Japan Joint Seminar on Nanoscale Thermal Transport Phenomena*. Coronado, CA. July 16-19, 2023.
12. "UCNP Thermometry Beyond the Diffraction Limit," *Upconverting Nanoparticles Gordon Research Conference*. Waterville Valley, NH. June 18-23, 2023.
11. "Time-Resolved Nanothermometry via Excited State Lifetimes of Nitrogen Vacancy Centers in Individual Nanodiamonds," *Park Systems NanoScientific Symposium*. September 29, 2022.
10. "Far-Field Optical Nanothermometry in Challenging Environments: Super-Resolution and Single-Particle Approaches," Columbia University Mechanical Engineering Seminar Series. September 23, 2022.
9. "Far-Field Optical Nanothermometry in Challenging Environments: Super-Resolution and Single-Particle Approaches," *Telluride Science Research Center Workshop on Thermal Transport at the Nanoscale*. Telluride, CO. June 20-25, 2022.
8. "Far-Field Optical Nanothermometry via Individual Luminescent Nanoparticles," Andor Technology Webinar Series. October 20, 2021.
7. "In luminescence thermometry we trust. Can we?" NanoTBTech Webinar Series (a project of the European Union's Horizon 2020 FET Open Programme). Invited panelist. June 4, 2021.
6. "Far-Field Optical Nanothermometry via Luminescent Nanomaterials," Rice University Mechanical Engineering Seminar Series. February 10, 2021.
5. "Far-Field Optical Nanothermometry via Luminescent Nanomaterials," Rochester Institute of Technology Physics Colloquium. October 28, 2020.

4. "Far-Field Optical Nanothermometry via Luminescent Nanomaterials," University of Rochester Institute of Optics Colloquium. October 12, 2020.
3. "Far-Field Optical Nanothermometry via Luminescent Nanomaterials," University of Rochester Department of Physics and Astronomy Colloquium. August 28, 2019.
2. "Extending Thermoelectricity to 3,000 K via Reduced Graphene Oxide Films." *WE-Heraeus-Seminar on System-oriented approach to thermoelectrics: Materials – Interfaces – Devices*. Bad Honnef, Germany. April 9-11, 2018.
1. "Investigating Apparent Self-Heating of Individual Luminescent Nanoparticle Thermometers," *The 9<sup>th</sup> US-Japan Joint Seminar on Nanoscale Thermal Transport Phenomena*. Tokyo, Japan. July 2-5, 2017. Invited poster presentation.

### Contributed Presentations

13. Z. Ye, B. Harrington, and A.D. Pickel, "Optical Super-Resolution Nanothermometry via Stimulated Emission Depletion Imaging of Upconverting Nanoparticles," *UPCON: 4th Conference on Properties, Design, and Applications of Upconversion Nanomaterials*. Montréal, Canada. April 7-12, 2024. Contributed talk.
12. Z. Ye, D.K. Bommidi, and A.D. Pickel, "Dual-Mode Operando Thermometry and Reaction Monitoring for Probing Thermal Contributions to Plasmonic Photocatalysis," *IMECE*. New Orleans, LA. October 29 – November 2, 2023. Contributed talk.
11. Z. Ye and A.D. Pickel, "Combining Ratiometric Thermometry and Super-Resolution Imaging of Upconverting Nanoparticles," *MRS Spring Meeting*. San Francisco, CA. April 10-14, 2023. Contributed talk.
10. D.K. Bommidi and A.D. Pickel, "Temperature-dependent excited state lifetimes of nitrogen vacancy centers in individual nanodiamonds." *ASME Summer Heat Transfer Conference*. Philadelphia, PA, July 11-13, 2022. Contributed talk.
9. D.K. Bommidi and A.D. Pickel, "Temperature-dependent excited state lifetimes of nitrogen vacancy centers in individual nanodiamonds." *APS March Meeting*. Chicago, IL, March 14-18, 2022. Contributed talk.
8. D.K. Bommidi and A.D. Pickel, "Temperature-dependent excited state lifetimes of nitrogen vacancy centers in individual nanodiamonds." *MRS Fall Meeting*. Boston, MA, November 29-December 2, 2021. Poster presentation.
7. A.D. Pickel and C. Dames, "Size and Shape Effects on the Measured Peak Temperatures of Nanoscale Hotspots." *IMECE*. Virtual conference, November 16-19, 2020. Contributed talk.
6. A.D. Pickel, A. Teitelboim, E.M. Chan, N.J. Borys, J.Y. Wu, P.J. Schuck, and C. Dames, "Measuring Nanoscale Hotspots with Individual Luminescent Nanoparticles." *MRS Spring Meeting*. Phoenix, AZ, April 22-26, 2019. Contributed talk.
5. A.D. Pickel, E.M. Chan, C. Aiello, N.J. Borys, N.S. Ginsberg, P.J. Schuck, and C. Dames, "Far-Field Optical Nanothermometry via Individual Upconverting Nanoparticles," *Advanced Imaging Methods Workshop*. Berkeley, CA. January 25, 2018. Poster presentation. (2<sup>nd</sup> Place Poster Award)
4. A.D. Pickel, J.D. Kilbane, E.M. Chan, C. Monachon, N.J. Borys, E.S. Levy, J.J. Urban, P.J. Schuck, and C. Dames, "Investigating Apparent Self-Heating of Individual Luminescent Nanoparticle

Thermometers," *Molecular Foundry User Meeting*. Berkeley, CA. August 17-18, 2017. Poster presentation.

3. A.D. Pickel, J.D. Kilbane, E.M. Chan, N.J. Borys, J.J. Urban, P.J. Schuck, and C. Dames. "Excitation Intensity Effects in Far-Field Optical Nanothermometry Using Individual Upconverting Nanoparticles." *ASME Summer Heat Transfer Conference*. Bellevue, WA, July 9-12, 2017. Contributed talk.
2. A.D. Pickel, J.D. Kilbane, E.M. Chan, C. Monachon, N.J. Borys, E.S. Levy, J.J. Urban, P.J. Schuck, and C. Dames, "Individual Upconverting Nanoparticles as Nanoscale Heaters and Thermometers." *MRS Spring Meeting*. Phoenix, AZ, April 17-21, 2017. Contributed talk.
1. A.D. Pickel, J.D. Kilbane, E.M. Chan, C. Monachon, N.J. Borys, E.S. Levy, J.J. Urban, P.J. Schuck, and C. Dames, "Far-Field Optical Nanothermometry Using Individual Upconverting Nanoparticles," *Molecular Foundry User Meeting*. Berkeley, CA. August 11-12, 2016. Poster presentation.

## Supervision

### PhD Students

- |   |                |
|---|----------------|
| Laura Kowalski (Optics)   | 2023 – present |
| <ul style="list-style-type: none"><li>• Recipient of a Department of Education Graduate Assistance in Areas of National Need (GAANN) Fellowship</li></ul> |                |
| Benjamin Harrington (Materials Science)   | 2021 – present |
| Ziyang Ye (Materials Science)   | 2019 – present |
| Dinesh Bommidi (Mechanical Engineering)   | 2019 – 2024    |
| <ul style="list-style-type: none"><li>• <i>Next position:</i> Optical/Production Engineer at ASML</li></ul>   |                |

### Undergraduates

- |  |                         |
|--|-------------------------|
| Asa Guldbrandsen, UR Mechanical Engineering Class of 2026  | Fall 2023 – present     |
| Gustavo Rivera Soto, UR Mechanical Engineering Class of 2025   | Spring 2023 – present   |
| Xiaoshan (Jennifer) Liu, UR Electrical and Computer Engineering Class of 2024  | Fall 2022 – present     |
| Melanie Earle, UR Mechanical Engineering Class of 2023   | Fall 2019 – Spring 2023 |
| <ul style="list-style-type: none"><li>• <i>Next position:</i> PhD student in Mechanical Engineering at UC Berkeley</li><li>• Recipient of the G. Harold Hook Prize</li><li>• Selected to attend Gulf Coast Undergraduate Research Symposium at Rice University</li></ul> |                         |
| Lingyun Huang, UR Mechanical Engineering Class of 2023   | Summer 2022 – Fall 2022 |
| <ul style="list-style-type: none"><li>• <i>Next position:</i> MS student in Mechanical Engineering at the University of Pennsylvania</li></ul>   |                         |
| Chenhao Jian, UR Mechanical Engineering Class of 2022  | Fall 2021 – Summer 2022 |
| <ul style="list-style-type: none"><li>• <i>Next position:</i> MS student in Mechanical Engineering at UCLA</li></ul>   |                         |

|   |                           |
|---|---------------------------|
| Weihan Wang, UR Mechanical Engineering Class of 2022  |                           |
| • <i>Next position:</i> MSE student in Mechanical Engineering at the University of Michigan | Fall 2021 – Spring 2022   |
| Yisheng Zhong, UR Mechanical Engineering Class of 2022                                      | Fall 2021                 |
| Carol Jerotich, UR Mechanical Engineering Class of 2022                                     | Spring 2020 – Spring 2021 |
| Stella Kombo, UR Mechanical Engineering Class of 2022                                       | Spring 2020 – Spring 2021 |
| Kelly Jean, UR Mechanical Engineering Class of 2021   | Spring 2020 – Spring 2021 |
| Linh Vu, UR Mechanical Engineering Class of 2023  | Spring 2020               |
| Caiden Larsen, UR Mechanical Engineering Class of 2023                                      | Spring 2020               |

## Professional Activities and Service

### Proposal Review

NSF: Division of Chemical, Bioengineering, Environmental, and Transport Systems (CBET); Division of Chemistry

Army Research Office

American Chemical Society Petroleum Research Fund (ACS PRF)

University of Rochester University Research Awards Program

University of Rochester PumpPrimer II Program

### Journal Article Review

|   |   |
|---|---|
| ACS Nano                                  | Light: Science and Applications                     |
| ACS Applied Electronic Materials          | Nano Letters  |
| Advanced Optical Materials                | Nanoscale and Microscale Thermophysical Engineering |
| Cell Biochemistry and Biophysics          | Nature Communications                               |
| International Journal of Thermal Sciences | Optics Express                                      |
| International Journal of Thermophysics    | Review of Scientific Instruments                    |
| Journal of Applied Physics                | Science Advances                                    |
| Journal of Heat Transfer                  |   |

### Professional Activities

Session Chair for 2023 IMECE, Session 11-58-01: Nanoscale Thermal Transport, November 1, 2023, New Orleans, LA

Session Chair for the 10<sup>th</sup> US-Japan Joint Seminar on Nanoscale Thermal Transport Phenomena, Session VII (Magnetism/Phonon), July 19, 2023, Coronado, CA

Session Chair for 2023 MRS Spring Meeting, Session SF03.17: Nanoscale Microscopy, April 14, 2023, San Francisco, CA

Session Chair for 2022 APS March Meeting, Session Q68: Thermal and Electrical Transport in Nanomaterials, March 16, 2022, Chicago, IL

Member of ASME Heat Transfer Division K-9 Committee on Nanoscale Thermal Transport

Member of ASME, MRS, and SWE

## Departmental and University Service

|                    |   |
|--------------------|---|
| 12/2022 – present  | New Science and Engineering Building Planning Committee                         |
| 09/2022 – present  | URnano (Nanofabrication Facility) User Steering Committee                       |
| 08/2021 – present  | Faculty Advisor to UR Society of Women Engineers (SWE) Chapter                  |
| 02/2022            | Sproull and Provost Fellowship Review Panels (Materials Science representative) |
| Summer/Fall 2021   | UR Mechanical Engineering Faculty Search Committee Member                       |
| 08/2020 – present  | UR Mechanical Engineering Undergraduate Advisor to Class of 2024 Students       |
| 08/2020 – present  | UR Mechanical Engineering MS Student Advisor                                    |
| 01/2020 – 05/2021; | UR Materials Science Graduate Admissions Committee                              |
| 01/2023 – present  |   |
| 08/2019 – present  | UR Mechanical Engineering Graduate Admissions Committee                         |
| 08/2019 – present  | UR Materials Science MS Student Advisor   |

PhD Dissertation Committees: Leopoldo Mejia (Chemistry, committee chair); Krysta Boccuzzi (Optics, committee chair); Wriju Chowdhury (Earth and Environmental Sciences); Likun Cai (Materials Science); Danika Luntz-Martin (Physics); Tyler Howard (Optics); Wenhui Hou (Electrical and Computer Engineering, committee chair); Tara Peña (Electrical and Computer Engineering, committee chair); Xuchen Gong (Mechanical Engineering); Wesley Chiang (Biophysics, committee chair)

## Teaching

### At University of Rochester

| Course  | Level                         | Semester    | Number of Responses | Overall Rating of Course | Overall Rating of Instructor |
|---|-------------------------------|-------------|---------------------|--------------------------|------------------------------|
| ME 433: Nanoscale Energy Transport and Conversion | Graduate elective             | Fall 2019   | 8                   | 4.9/5.0                  | 5.0/5.0                      |
| ME 433: Nanoscale Energy Transport and Conversion | Graduate elective             | Fall 2020   | 3                   | 4.33/5.0                 | 4.67/5.0                     |
| ME 223: Heat Transfer                             | Required undergraduate course | Spring 2021 | 24                  | 4.30/5.0                 | 4.57/5.0                     |
| ME 433: Nanoscale Energy Transport and Conversion | Graduate elective             | Fall 2021   | 2                   | 5.0/5.0                  | 5.0/5.0                      |
| ME 223: Heat Transfer                             | Required undergraduate course | Spring 2022 | 19                  | 4.74/5.0                 | 4.79/5.0                     |
| ME 433: Nanoscale Energy Transport and Conversion | Graduate elective             | Fall 2022   | 3                   | 5.0/5.0                  | 5.0/5.0                      |

|   |                               |             |   |          |          |
|---|-------------------------------|-------------|---|----------|----------|
| ME 223: Heat Transfer                             | Required undergraduate course | Spring 2023 | 9 | 4.78/5.0 | 4.56/5.0 |
| ME 433: Nanoscale Energy Transport and Conversion | Graduate elective             | Fall 2023   | 6 | 5.0/5.0  | 5.0/5.0  |

- Received a **2022 Wadsworth C. Sykes Engineering Faculty Award of \$11,200** to develop a new laboratory activity on luminescence lifetime thermometry for ME 223 (undergraduate heat transfer)

### Prior to University of Rochester

- 06/18 – 08/18 Graduate Student Instructor for ME 109: Heat Transfer, UC Berkeley
- Average student evaluation score: 4.7/5.0 (Department average: 4.19/5.0)
- 05/11 – 05/14 Peer Tutor, Carnegie Mellon University
- College Reading and Learning Association (CRLA) Level 1 Certified Tutor for physics, calculus, and engineering courses for six semesters

### **Outreach**

- 07/22 – present: Partnership with Innova Girls Academy, Rochester, NY
- Established a partnership with a new all-girls STEM-focused public elementary school in the Rochester City School District
  - Designed, constructed, and presented hands-on kits that introduce basic principles of light and luminescence to Innova Girls Academy students
- 08/14 – 05/19 Students for Environmental Energy Development, UC Berkeley
- Volunteer with outreach program focused on energy/water resources
  - Served as Chair for the 2015-2016 academic year: designed lesson plans, recruited volunteers, and managed partnership with the elementary school
- 08/17 – 05/19 Events Chair, Graduate Women in Engineering, UC Berkeley
- Organized social/professional development events open to all graduate students
- 08/15 – 05/17 Speaker Series Co-Chair, Graduate Women in Engineering, UC Berkeley
- Invited speakers and coordinated logistics for series sponsored by Sandia National Lab
- 06/16 – 08/16 Research Mentor, Berkeley Engineering Research Experiences for Teachers, UC Berkeley
- Mentored a high school physics teacher and a UC Berkeley undergraduate student on summer research projects