Siavash Khodakarami

Education

Ph.D. in Mechanical Science and Engineering, **GPA: 3.92/4** 2019 - Present
University of Illinois at Urbana – Champaign

Selected Courses: Data Science in Manufacturing Quality Control, Computational Photography, Computer Vision, Machine Learning, Machine Learning for Signal Processing, Thermal Systems, Intermediate Heat Transfer, Multiphase Processes, Electrochemical Methods

B.Sc. in Mechanical Engineering 2014 - 2018
University of Tehran, Tehran, Iran
Final project: Simulation of a two-stage vapor compression refrigeration cycle with inverter compressor, annual part-load energy study
GPA: 18.31/20 (**3.96/4**) via 142 credit hours, (Top 5%)

Working Experience

Graduate Research Assistant at Energy Transport Research Lab 2019 - Present
Mechanical Science and Engineering Dep., UIUC
Graduate Researcher at Air Conditioning and Refrigeration Center (ACRC), UIUC 2019 - Present

Teaching Assistant at Mechanical Eng. Dep., University of Tehran
Thermodynamics I (Fall 2018), Thermodynamics II (Fall 2018), Automatic Control (Spring 2018)

Internship, Andikala Co. (Secop compressor organization in Iran) Summer 2017
Working in the lab on refrigeration systems and reciprocating compressors.

Internship, Quality Control Dep. of Takvin factory, Tehran, Iran Summer 2015

Research Experience

Phase change heat transfer

- Visualization and quantification of jumping droplet, dropwise and filmwise steam and low-surface energy fluids (ethanol, R-134, and R1234zd) condensation in a vacuum chamber. Collected data through LabVIEW.

Computer vision and image processing

- Heat Transfer prediction using machine learning and image processing.
- Detection of falling droplets from the tube using videos from DSLR camera and high speed camera. Application of the image processing and machine learning for local heat transfer measurement.
- On-tube droplet detection and segmentation using Mask R-CNN. Post-processing the results for droplet distribution extraction.
- Working toward predicting condensation heat transfer coefficient using video recordings and computer vision techniques.

Defrosting/De-icing

- Conducted a simultion study on pulsed electro-thermal de-icing on vertical surfaces (Matlab code and Ansys Fluent).
- Built an experimental setup and investigated the pulsed electro-thermal defrosting/de-icing via fabrication of thin film heaters at the surface-frost/ice interface.
- Investigation of the pulse electro-thermal heating between parallel surfaces for finned heat exchanger applications.

Surface engineering

- Condensation heat transfer enhancement through surface nanoengineering.
- Built a flow corrosion loop to study the corrosion and fouling inside the internally coated tubes at different flow and temperature ranges. Collected data through LabVIEW.
- Conducted electrochemical impedance spectroscopy (EIS) and Tafel polarization studies on metallic surfaces with vareity of coatings (superhydrophobic, sol-gel SiO_2, Parylene, etc.).

Contact

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Linkedin Profile

Research Area

- Phase Change Heat Transfer
- Image Processing and Computer Vision
- Surface Sciences
- Thermal Management

Skills

Software

- Python, MATLAB, EES
- SolidWorks
- Ansys Fluent
- Blender
- Microsoft Office
- LabVIEW

Others

- Image Processing
- SEM, AFM, CVD
- Cleanroom experience (50 hr.)
- German language (B1 certificate, 82/100)

Honors

- MechSE distinguished fellowship at University of Illinois at Urbana – Champaign, 2019 - 2020
- Awarded by the Mechanical Eng. Dep. at University of Tehran for being among the top 5% of the class, 2017
- Awarded for being in the Dean's list at school of Mechanical Eng. at the University of Tehran in the academic year 2017-2018
- Top 1% in nationwide university entrance exam in Iran for both Mathematics and Physics and Foreign Languages related fields.

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Publications

1) Siavash Khodakarami, Hanyang Zhao, Kazi Fazle Rabbi, and Nenad Miljkovic, "Scalable Corrosion-Resistant Coatings for Thermal Applications", *ACS Applied Materials & Interfaces* **2021** *13* (3), 4519-4534

2) Siavash Khodakarami, Longnan Li, and Nenad Miljkovic, "Ultra-efficient and ultra-rapid solar cell de-icing and de-snowing", *Proc. SPIE 11824, New Concepts in Solar and Thermal Radiation Conversion IV, 118240C,* **2021**

3) Hanyang Zhao, Siavash Khodakarami, Chirag Anand Deshpande, Jingcheng Ma, Qiyuan Wu, Soumyadip Sett, and Nenad Miljkovic, "Scalable Slippery Omniphobic Covalently Attached Liquid Coatings for Flow Fouling Reduction", *ACS Applied Materials & Interfaces* **2021** *13* (32), 38666-38679

4) Mohamed H. Mousa, Alperen Günay, Daniel Orejon, Siavash Khodakarami, Kashif Nawaz, and Nenad Miljkovic, "Gas-Phase Temperature Mapping of Evaporating Microdroplets", *ACS Applied Materials & Interfaces*, **2021** *13* (13), 15925-15938

5) Longnan Li[+] and Siavash Khodakarami[+], Kazi Fazle Rabbi, and Nenad Miljkovic, "Enabling Renewable Energy Technologies in Harsh Climates with Ultra-Efficient Electro-Thermal Desnowing, Defrosting, and Deicing", **under review in *Joule*, 2021** ([+]equal contribution)

6) Jin Yao Ho, Kazi Fazle Rabbi, Siavash Khodakarami, Jingcheng Ma, Kalyan S. Boyina, and Nenad Miljkovic, "Opportunities in Nanoengineered Surface Designs for Enhanced Condensation Heat and Mass Transfer", **under review in *Journal of Heat Transfer*, 2021**

7) Xiao Yan, Feipeng Chen, Chongyan Zhao, Xiong Wang, Longnan Li, Siavash Khodakarami, Kazi Fazle Rabbi, Jiaqi Li, Muhammad Jahidul Hoque, Feng Chen, Jie Feng, and Nenad Miljkovic, "Near Field Condensation", **under review in *Science Advances*, 2021**

8) Jin Yao Ho, Kazi Fazle Rabbi, Siavash Khodakarami, Soumyadip Dett, Teck Neng Wong, Kai Choong Lenog, William P King, and Nenad Miljkovic "Surface Structuring of Metal Additively Manufactured Materials" **under review in *Joule*, 2021**

9) Siavash Khodakarami, Kazi Fazle Rabbi, and Nenad Miljkovic, "Machine learning enabled high-fidelity condensation heat transfer characterization", **in preparation, 2021**