Shayan Davani

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Summary

Detail-oriented engineer with demonstrated experties in design, fabrication, test, and modeling of MEMS, microfluidics, and thermal systems. Hands-on experience in device characterization (optical, structural, thermal, electrical). Skilled with CAD, CFD tools, and structural Finite Element Analysis

Technical Skills and Experience

General skills/prototyping: Data acquisition, Rapid prototyping, Machine shop, Controllers/sensors

Microfabrication: Photomask Design, Photolithography, spin coating, dry oxidation, Wet/Dry Etch, Wafer Bonding, Wafer Packaging, Thin films, Oxygen plasma bonding

Analytical Skills: Microfluidics, MEMS Design, Thermal analysis, Statistical Process Control (SPC), FMEA, Finite Element Analysis (FEA), CAD tools, Data analysis, Fluid flow, Structural analysis

Characterization: SEM, 3D confocal laser microscope (VK-100), Optical microscope, Film thickness measurement (Filmetrics), Surface profilometer (Dektak 150), Infrared Thermography (FLIR), thermal sensors

Software Skills

- ANSYS-Fluent
- L-Edit
- C/C++
- COMSOL
- SolidWorks
- Microsoft Office
- MATLAB
- AutoCAD
- R
- LabView
- TCAD
- Minitab

Work Experience

Postdoctoral Research Fellow

Aug 2019-present
Ruston, LA

Multiscale Energy and Materials lab, Louisiana Tech University

- Conducted validation tests, accurate thermal measurements, and data acquisition to evaluate the heat transfer performance of different thermal management solutions (multiphase, forced convection, natural convection)
- Improved the surface cooling performance by forming CuO nano-structures coating on heating surface
- Led the image processing project for extracting the bubble features (diameter, number) from high speed videos
- Collaborated in design, fabrication, and test of a setup for evaluating the multi-phase cooling at saturation point

Graduate Research Assistant

Sep 2013-Feb 2019
Ruston, LA

Microfluidics Lab, Louisiana Tech University

- Designed a single complementary photomask for front and backside photolithography process (2 layer)
- Generated a hard mask for KOH etch process by HF etching of the SiO2 layer grown through dry oxidation
- Applied photolithography (front and backside) and anisotropic etch (KOH etch of silicon) for defining microchannels in silicon wafer
- Performed wafer dicing, bonding, and packaging to seal the counterflow microfluidic devices
- Applied the low-cost rapid prototyping technique to fabricate the hybrid (Glass/Kapton/Quartz) microfluidic chips
- Performed GR&R analysis to find the uncertainty associated with the performance of microfluidic device

Intern

June 2009-Sep 2009
Iran, Shiraz

Farabard Co, Design, production, and construction of cooling towers for industry

- Applied Meshing tool Gambit software for generating mesh for NACA airfoils
- Interpreted handbooks, designs, and industrial standards

Technical Projects

- Design analysis of a highly sensitive thermoelectric MEMS sensor for biological sensing applications (FEA)
- Experimental and numerical study of pressure effect on natural convection cooling (CFD)
- Process simulation of a delta-doped MOSFET using TSUPREM4
- Nonlinear Mechanical-electrical analysis of a flexible 3D printed MEMS strain-sensor (FEA)

Education

Ph.D. Feb. 2019
Engineering, Micro/Nanoscale Systems GPA 3.88
Louisiana Tech University, Ruston, LA
Dissertation title: "Development of a Counter-flow Thermal Gradient Microfluidic Device"

Master of Engineering Jan. 2012
Mechanical Engineering Department GPA 3.46
Sahand University of Technology, Tabriz, Iran
Thesis title: "Numerical analysis of flow and heat transfer of wavy microchannels in slip-flow regime" (Forced Convection cooling application)

Bachelor of Science Sep. 2009
Mechanical Engineering Department GPA 3.00
Shiraz University, Shiraz, Iran

PUBLICATIONS/ TECHNICAL PRESENTATIONS

Shayan Davani, Varun L. Kopparthy, Niel D. Crews. "*Detecting Thermal Asymmetry in Microfluidics for Sensor Applications: Critical Design Considerations and Optimization"* International Journal of Heat and Mass Transfer, 2019

Shayan Davani, Farnaz Rezaei, Arden L. Moore, Niel D. Crews. "*Counter-flow for Stabilization of Microfluidic Thermal Reactors".* Applied Thermal Engineering Journal, **Under Review**, October 2020

Shayan Davani, S. M. Mahdi Mofidian, Kasra Momeni, Hamzeh Bardaweel. "*3D-Printed Strain Sensors: Electro-Mechanical Simulation and Design Analysis using Nonlinear Material Model and Experimental Investigation".* IEEE sensors, 2020

Shayan Davani, Bin Zhang, Luke Hansen, Wen J. Meng, Arden, L. Moore. "Subcooled Pool Boiling Performance of As-rolled and Nanostructure-modified 1D Micro-Fin Arrays by High Throughput Roll Molding". **Working paper**

Brandon Doran, Bin Zhang, Kojo Asiamah Osafo, **Shayan Davani**, Abigail Walker, Stephen Akwaboa, Wen J. Meng, Patrick Mensah, Arden L. Moore. "Subcooled Pool Boiling Performance of Aluminum Alloy 1D Micro-Fin Arrays Fabricated by High Throughput Roll Molding". **Working paper**

Shayan Davani, Bin Zhang, Luke Hansen, Wen Jin Meng, Arden, L. Moore. "Subcooled Pool Boiling Performance of As-rolled and Nanostructured 1D Micro-Fin Arrays by High Throughput Roll Molding". 2020 Consortium for Innovation in Manufacturing & Materials (CIMM) Symposium (LA EPSCoR)- **3rd place (Among the participants of five Louisiana Universities)**

Shayan Davani, Varun L. Kopparthy, Niel D. Crews. "Continuous-flow Microfluidic Calorimeter: Sensitivity Optimization of Experimental Prototype through 3-D Modeling." International Conference on Nanochannels, Microchannels, and Minichannels, ASME2017

Shayan Davani, Varun L. Kopparthy, Niel D. Crews. "Highly Sensitive Thermal Sensor for Microfluidic Chips: 3-D Modeling for Design Considerations and Optimizations". International Conference on Nanochannels, Microchannels, and Minichannels, ASME2017

Shayan Davani, Niel D. Crews. "Characterization and Modification of a Mesoscale Temperature Gradient". Heat Transfer, Fluids Engineering, & Nanochannels, Microchannels, and Minichannels Conferences, ASME 2016

Certifications/ Organizations

SIX-SIGMA (GREEN BELT)	Louisiana Tech University	Apr 2017-No expiration date
MATLAB Image processing	UDEMY	Dec 2019-No expiration date
Learning LabView	LinkedIn Learning	Nov 2020-No expiration date
Introduction to GD&T	LinkedIn Learning	Nov 2020-No expiration date

Organizations ASME (2015-present), SAMPE (2018, present