

Exponent®
Engineering & Scientific Consulting

Farooq Siddiqui, Ph.D.

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Professional Profile

Dr. Siddiqui is an engineering consultant who offers technical expertise to clients and supports dispute resolution cases. As an expert in mechanical engineering, he helps clients understand the root cause of product failures and provides recommendations on mitigation strategies for a safe product design. He has supported several litigation and international arbitration cases involving technical disputes, product liability claims, and recalls. He has expertise in areas involving thermal-fluid engineering, HVACR, renewable energy, heat exchangers, power plants, and desalination.

Dr. Siddiqui has experience with optical characterization techniques such as optical tensiometry and high-speed imaging; thermal characterization techniques such as infrared imaging, thermal conductivity analysis, and differential scanning calorimetry; rheological characterization techniques such as viscometry; colloid characterization techniques such as zeta potential/nanoparticle size analysis and UV-vis spectrophotometry; colloid stabilization techniques such as steric and electrostatic stabilization, colloid synthesis techniques such as ultrasonication bath and probe sonication, and surface characterization techniques such as electron microscopy (SEM/TEM), optical microscopy and optical profilometry. He is proficient in finite element analysis (FEA) and modeling software such as Solidworks, COMSOL Multiphysics, and Ansys Fluent, mathematical software such as MATLAB and Engineering Equation Solver (EES), and real-time data acquisition software such as LabView. Dr. Siddiqui applies these characterization techniques to solve problems involving electronic packaging, batteries, HVAC, industrial chillers, and heat exchangers.

Prior to joining Exponent, Dr. Siddiqui worked as a research assistant at the Center of Research Excellence–Renewable Energy at King Fahd University of Petroleum and Minerals, Saudi Arabia. There he designed storage systems to address intermittency issues in solar absorption chillers. Dr. Siddiqui also worked as a design engineer for a start-up company and later held a lecturer position at the University of Madinah, Saudi Arabia.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Hong Kong University of Science and Tech, 2021

M.S., Mechanical Engineering, King Fahd Univ of Petroleum and Minerals, 2014

B.E., Mechanical Engineering, National University of Sciences and Tech, 2011

Recipient of the Hong Kong PhD Fellowship Scheme (HKPFS) from the Government of Hong Kong.

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Prior Experience

Lecturer, Mechanical Engineering Department, University in Madina, KSA, 2014-2017.

Design Engineer, Saudi Aerospace Technologies, KSA, 2014.

Research Assistant, Center of Research Excellence-Renewable energy, KFUPM, KSA, 2011-2014.

Professional Affiliations

American Society of Mechanical Engineers (ASME)

Patents

Hybrid Storage Absorption Refrigeration System. Patent No. US 8,881,539 B1.

Publications

Book Chapters

Qiming Zhang, Farooq Siddiqui (2024). Electronics thermal design for optimum chip cooling. Computer Engineering Applications in Electronic, Biomedical, and Automotive Systems, Nova Science Publishers.

Asim M, Zia AW, Siddiqui FR, Hussain SA (2023). Design and modeling of solar energy systems. Solar Energy Harvesting, Conversion, and Storage, Elsevier.

Publications

Siddiqui FR, Tso CY, Qiu HH, Chao CYH, Fu SC (2022). Hybrid nanofluid spray cooling performance and its residue surface effects: Toward thermal management of high heat flux devices. Applied Thermal Engineering, 211, 118454.

Asim M, Siddiqui FR (2022). Hybrid nanofluids—next-generation fluids for spray-cooling-based thermal management of high-heat-flux devices. Nanomaterials, 12 (3), 507.

Siddiqui FR, Tso CY, Fu SC, Qiu HH, Chao CYH (2021). Droplet evaporation and boiling for different mixing ratios of the silver-graphene hybrid nanofluid over heated surfaces. International Journal of Heat and Mass Transfer, 180, 12786. https://doi.org/10.1016/j.ijheatmasstransfer.2021.121786

Siddiqui FR, Tso CY, Fu SC, Qiu HH, Chao CYH (2021). Droplet evaporation of Cu-Al2O3 hybrid nanofluid over its residue and copper surfaces: toward developing a new analytical model. Journal of Heat Transfer, 143 (2), 021604. https://doi.org/10.1115/1.4048970

Siddiqui FR, Tso CY, Fu SC, Qiu HH, Chao CYH (2020). Evaporation and wetting behavior of silver-graphene hybrid nanofluid droplet on its porous residue surface for various mixing ratios. International Journal of Heat and Mass Transfer, 153, 119618. https://doi.org/10.1016/j.ijheatmasstransfer.2020.119618

Siddiqui FR, Tso CY, Chan KC, Fu SC, Chao CYH (2019). On trade-off for dispersion stability and thermal transport of Cu-Al2O3 hybrid nanofluid for various mixing ratios. International Journal of Heat and Mass Transfer, 132, 1200-1216. https://doi.org/10.1016/j.ijheatmasstransfer.2018.12.094

Siddiqui FR, Tso CY, Chan KC, Fu SC, Chao CYH (2019). Dataset on critical parameters of dispersion stability of Cu/Al2O3 nanofluid and hybrid nanofluid for various ultra-sonication times. Data in brief, 22, 863-865. https://doi.org/10.1016/j.dib.2019.01.007

Elminshawy NAS, Siddiqui FR, Farooq QU, Addas MF (2017). Experimental investigation on the performance of earth-air pipe heat exchanger for different soil compaction levels. Applied Thermal Engineering, 124, 1319-1327. https://doi.org/10.1016/j.applthermaleng.2017.06.119

Siddiqui FR, Elminshawy NAS, Addas MF (2016). Design and performance improvement of a solar desalination system by using solar air heater: Experimental and theoretical approach. Desalination, 399, 78-87. http://dx.doi.org/10.1016/j.desal.2016.08.015

Elminshawy NAS, Siddiqui FR, Addas MF (2016). Development of an active solar humidification-dehumidification (HDH) desalination system integrated with geothermal energy. Energy Conversion and Management, 126, 608-621. http://dx.doi.org/10.1016/j.enconman.2016.08.044

Elminshawy NAS, Siddiqui FR, Sultan GI (2015). Development of a desalination system driven by solar energy and low grade waste heat. Energy Conversion and Management, 103, 28–35. http://doi.org/10.1016/j.enconman.2015.06.035

Elminshawy NAS, Siddiqui FR, Addas MF (2015). Experimental and analytical study on productivity augmentation of a novel solar humidification–dehumidification (HDH) system. Desalination, 365, 36–45. http://doi.org/10.1016/j.desal.2015.02.019

Siddiqui FR, El-Shaarawi MAI, Said SAM. (2014). Exergo-economic analysis of a solar driven hybrid storage absorption refrigeration cycle. Energy Conversion and Management, 80, 165–172. http://doi.org/10.1016/j.enconman.2014.01.029

El-Shaarawi MAI, Said SAM, Siddiqui FR (2014). Unsteady thermodynamic analysis for a solar driven dual storage absorption refrigeration cycle in Saudi Arabia. Solar Energy, 110, 286–302. http://doi.org/10.1016/j.solener.2014.08.032

Presentations

Invited talk of ASME 2020 Heat Transfer Summer Conference, Orlando, FL, USA, “Evaporation of silver-graphene hybrid nanofluid droplet on its nanostructured residue and plain copper surfaces at elevated temperatures”. https://doi.org/10.1115/HT2020-8922

Invited talk of ASME-JSME-KSME 2019 8th Joint Fluids Engineering Conference, San Francisco, CA, USA, “Experimental Investigation on Silver-Graphene Hybrid Nanofluid Droplet Evaporation and Wetting Characteristics of its Nanostructured Droplet Residue”. https://doi.org/10.1115/AJKFluids2019-5049

Invited talk of ASPIRE LEAGUE FORUM 2019, Tokyo, Japan on Better Living: Innovations and Technologies to Improve Lives, “The roles robots and robotic technology can play to ensure Better Living for the socially vulnerable, looking ahead to the year 2040”.

Asim M, Siddiqui FR (2022). Hybrid Nanofluids—Next-Generation Fluids for Spray-Cooling-Based Thermal Management of High-Heat-Flux Devices. Nanomaterials, 12(3), Article 3. https://doi.org/10.3390/nano12030507

Siddiqui FR, Tso CY, Qiu HH, Chao CYH, Fu SC (2022). Hybrid nanofluid spray cooling performance and its residue surface effects: Toward thermal management of high heat flux devices. Applied Thermal Engineering, 211, 118454. https://doi.org/10.1016/j.applthermaleng.2022.118454

Siddiqui FR, Tso CY, Qiu HH, Chao CYH, Fu SC (2022). Copper-alumina hybrid nanofluid droplet phase

change dynamics over heated plain copper and porous residue surfaces. International Journal of Thermal Sciences, 182, 107795. https://doi.org/10.1016/j.ijthermalsci.2022.107795

Additional Education & Training

Received certified training from GUNT Hamburg for compression refrigeration system and centrifugal pump.

Got certified training on Hot Disk TPS 500S thermal constants analyzer.