



Spring 2021 Mechanical Engineering Distinguished Speaker Series

Professor Hadi Ghasemi
Cullen Associate Professor
Department of Mechanical Engineering
University of Houston

Date and time: March 18 2021 @ 3:30 PM

Venue: Online Zoom

<https://virginiatech.zoom.us/j/89590901137?pwd=VmdxMzJUWmxzRTlTT2o1UWV2gwQT09>

Meeting ID: 895 9090 1137

Passcode: 407685

Nano/molecular scale interfacial science: Fundamentals to real world applications

ABSTRACT

A fundamental understanding of solid-liquid interfaces plays a critical role in energy, water and even biological systems. Knowledge on physics of these interfaces allows us to control interfacial momentum and energy transfer in multiple length and time scales and to create new surfaces with unprecedented characteristics.

Miniaturization and enhanced functional performance have been the main focuses of advancement in high-performance integrated circuits, power electronics, and photonic devices in the last few decades. This trend has amplified the generated thermal energy in these devices making the thermal management a bottleneck for the accelerated innovation in these disciplines. We introduce a general Artificial Intelligence (AI) platform to address this challenge and guide discovery of hierarchical structures for extreme thermal management in a broad spectrum of technologies including electronics, hypersonic aviation and electric vehicles.

In the second part, we discuss fundamental physics of ice/water system and the role of interfacial science on this phenomenon. Through understanding of these underpinnings, several anti-icing surface technologies are developed and matured to high technology readiness levels. These surfaces outperform state-of-the-art anti-icing surfaces with ice formation temperature of $-34\text{ }^{\circ}\text{C}$, ice adhesion of $< 10\text{ kPa}$ and high durability exposed to rain erosion condition.

Speaker Biography



Hadi Ghasemi is Cullen Associate Professor in the Department of Mechanical Engineering at the University of Houston and director of Nanotherm research group. He received his PhD degree in 2011 from the University of Toronto. He continued his studies as a Postdoctoral Associate at Massachusetts Institute of Technology (MIT) from 2012 to 2014. He is the recipient of the several awards in the field of heat transfer and surface physics including Early Innovator Award, Texas New Venture Competition award, AFOSR Young Investigator Award, top-three innovator award of NASA iTech, University Research Excellence Award. He is a co-founder of Elemental Coatings company. He was selected as one of the finalists for World Technology Award in the energy category in 2014. His research works are highlighted in Nature, Economists and Popular Science among others. His current research interests are in nanotechnology, surface physics and heat transfer.

Host: Dr. Jonathan Boreyko