

# Weekly CEA FM Seminar: Fall 2014



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Date: **Friday, December 5, 2014**  
Time: 11:00 AM  
Location: Gilman Hall # 132  
Speaker: **Prof. Jacopo Buongiorno** (Massachusetts Institute of Technology)  
Title: ***“Uncovering the Secrets of Boiling Heat Transfer with  
Advanced Diagnostics and Nano-engineered Surfaces”***

## Abstract

This presentation will review the MIT studies in the area of nucleate boiling heat transfer phenomena through a combination of innovative diagnostics and surfaces carefully engineered at the micro- and nano-scale. Experimental data for inspiration and validation of advanced nucleate boiling models are obtained in pool- and flow-boiling facilities that allow time- and space-resolved measurement of a series of important boiling-relevant quantities, including velocity and temperature distributions around individual bubbles, bubble shape, departure diameter and frequency, areal phase distribution and more. The facilities comprise specially-designed heaters made of indium tin oxide (ITO) and integrated high-frequency Particle Imaging Velocimetry (PIV), Infrared Thermometry (IR) and High-Speed Video (HSV). Other work has been exploring the separate effects of surface roughness, wettability and porosity on both Critical Heat Flux (CHF) and quenching heat transfer (Leidenfrost point temperature). This is made possible by the use of surfaces with engineered features (e.g. posts, coatings, nanoparticle layers) at the micro- and nano-scale, which enabled varying the surface roughness, wettability and porosity precisely and independently from each other.