

School of Engineering Seminar



SAN FRANCISCO
STATE UNIVERSITY

Speaker:

Energy Efficiency for Industrial Decarbonization

Dr. Ethan
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Associate Professor,
Tennessee Tech
University

Abstract: The U.S. Department of Energy's Industrial Decarbonization Roadmap, published in September 2022, identifies energy efficiency as one of the four pillars of decarbonizing the manufacturing industry. Improving industrial energy efficiency not only reduces energy costs and usage for manufacturers, but also decreases greenhouse gas emissions and increases plant resiliency. In this seminar, Dr. Languri will delve into the details of several energy efficiency projects that he has led as the principal investigator. One such project involves the efficient cooling of transformers, which are critical components in the power industry, used in transmission and distribution systems for voltage-changing devices. Transformers generate heat that requires management to increase their lifetime and reduce maintenance costs. Efficient transformer cooling is an essential factor in this regard. It has been reported that the lifetime of transformers can increase by 10% with just a 1°C decrease in core temperature. However, traditional transformer oil, typically a mineral oil, has low thermal conductivity which limits heat transfer from the core of the transformer to the surroundings. To address this issue, the seminar will discuss the use of functionalized nanodiamond particles to enhance the heat transfer rate of transformer oil, leading to a remarkable 82.5% improvement in natural convection heat transfer with only 0.4% weight functionalized nanodiamonds added to the baseline fluid. The study examines the transformational growth in heat transfer rate achieved by functionalizing 5 nm-size diamond particles to transformer oil's molecules.

Date:

Friday
Mar. 3, 2023
1:00-1:50 PM

Location:

Hensill Hall (HH) 803

Speaker Bio: Ethan Languri is an Associate Professor of Mechanical Engineering with tenure, a licensed Professional Engineer (PE) in the State of Tennessee, and Director of the U.S. Department of Energy sponsored Industrial Assessment Center at Tennessee Tech University. Prior to joining Tennessee Tech as a tenure-track Assistant Professor in 2014, he was a Senior Mechanical Engineer at Applied Research Associates in Panama City, Florida, where he was involved with energy design and analysis for buildings and shelters for the U.S. Department of Defense contracts. Dr. Languri earned his Mechanical Engineering Ph.D. in 2011 from University of Wisconsin-Milwaukee, Milwaukee, Wisconsin followed by Postdoctoral Fellow appointments at the University of Wisconsin-Milwaukee and Texas A&M University, College Station, Texas. He obtained his Bachelor's and Master's degrees in Mechanical Engineering from Babol Noshirvani University of Technology in Iran in 2005 and 2007, respectively.

For more information, please contact Dr. Ed Cheng, ascheng@sfsu.edu