Thermal Transport in Architected Open Cell Foams

Wilson K. S. Chiu, Ph.D. Professor Department of Mechanical Engineering University of Connecticut Storrs, Connecticut, USA <u>wchiu@engr.uconn.edu</u>



<u>Abstract</u>

Open cell foams allow for the design of structures with locally tunable heat transfer performance compared to conventional porous materials. This new class of material has application to heat exchangers for heating, ventilation, air conditioning and refrigeration systems, heat sinks, electronic power dissipation, fire barriers, and thermal energy storage. This talk will present our studies on the thermal transport of architected open cell forms compared to conventionally casted open cell foams, specifically comparing conduction and convection heat transfer performance in these structures. The presentation will then demonstrate the use of genetic algorithms to optimize triply periodic minimal surface (TPMS) structures. We will conclude with a discussion on the potential use of novel additive manufacturing techniques such as 3-D printing to fabricate such structures.

About the Speaker

Wilson K. S. Chiu earned his M.S. and Ph.D. degrees in Mechanical Engineering from Rutgers University in 1997 and 1999, respectively. His research was supported by the U.S. Army Research Office, Department of Energy, National Science Foundation, Office of Naval Research, and industry. He published 7 book chapters/special volumes, 124 journal articles and 201 conference articles/abstracts. Among his honors, he was elected Fellow of the American Society of Mechanical Engineers (ASME) and the American Society of Thermal and Fluids Engineers (ASTFE), elected member of the Connecticut Academy of Science and Engineering, awarded the Otto Mønsted Guest Professorship at the Technical University of Denmark and the United Technologies *Corporation Professorship in Engineering Innovation* at the University of Connecticut. He received the Office of Naval Research Young Investigator (YIP) Award, Army Research Office Young Investigator (YIP) Award, and the NSF CAREER Award. He is the Editor-in-Chief of the ASME Journal of Electrochemical Energy Conversion and Storage, and served as an associate editor for the International Journal of Thermal Sciences and ASME Journal of Heat Transfer, and on the editorial board of Scientific Reports and several other journals. He has given over 120 plenary, keynote and invited lectures in the United States and abroad.