

**Dr. David Huitink****Assistant Professor of Mechanical Engineering
University of Arkansas – Fayetteville****Thursday, February 10th****9:00 AM—ME2054****WebEx Link: <https://bit.ly/huitink-seminar>****Passcode: BoilerUp2022****Thermal and Reliability Considerations in Design and Manufacturing of Power Dense Electronics for Vehicle Electrification and Beyond****Abstract:**

Electrified transportation has dominated recent technology trends, notably among automobiles, but also with aviation and naval markets. This has largely been coincident with advances in densification of power electronics, which is challenging conventional electronics packaging materials and architectures. With increased power density, thermal management and reliability are increasingly critical in the design of power electronic systems. Conventional heat sinks no longer can adequately dissipate heat; and higher frequency operation also intensifies electromagnetic interference. And while increased efficiency and temperature stability in wide bandgap semiconductor devices are central to future power conversion technology, packaging research will enable the promised power density with reliability. To deliver this future, integrative design for thermal, material, and electrical performance is needed. In this talk, these trends and recent integrative research efforts in power electronics enablement at University of Arkansas will be discussed, with particular emphasis on technologies aimed at delivering reliability in the context of thermal management and materials selection.

Biography:

Professor David Huitink joined the faculty in Mechanical Engineering at the University of Arkansas in 2016, prior to which he spent more than 5 years in industry, working in microelectronics technology development and manufacturing at Intel Corporation, where he served as Quality & Reliability Engineering Program Manager for Intel's Custom Foundry Division. There he pioneered the development of advanced methods of predicting reliability of silicon-based flip chip microelectronic packages, as well as developed testing protocols and FEA methods for governing Design for Reliability (DfR) guidance. He managed the foundry customer adoption of 2.5D packaging technology in high performance FPGA processors, along with advancing assembly materials selection for large die and multi-chip packages.

In academia, Dr. Huitink has built a research program at the intersection of thermal and materials sciences, with primary application in creating solutions for enabling high power dense and reliable electronics. This includes novel material and manufacturing approaches to thermal management of power electronics in electric aircraft and automobiles, as well as development of materials and process methodologies for multifunctional packaging architectures for heat dissipation and structural stability in extending device lifetimes. Working closely with Electrical Engineering collaborators, his team has developed additive manufactured cooling technologies that incorporate design features for passive thermal management with nano-enhanced phase change materials, in addition to EMI shielding jet manifolds for high convective heat transfer. On a more fundamental research level, he also investigates nanoscale thermal transport phenomena from inductively heated nanoparticles, for enabling new heat delivery mechanisms through alternating electromagnetic fields.

Prior to his industry experience, Dr. Huitink received his PhD in Mechanical Engineering from Texas A&M University as a NSF Graduate Research Fellow, working on complex nano-scale interactions at material interfaces under chemical and mechanical influence.