

Title: "ELECTRONICS THERMAL MANAGEMENT AT THE EXTREMES"

Kenneth E. Goodson  
Davies Family Provostial Professor  
Bosch Department Chairman  
Stanford Mechanical Engineering  
nanoheat.stanford.edu

#### ABSTRACT

The heat generated by electronics is a big problem for a variety of exciting products and systems including smartphones, electric vehicles, and satellites. "Extreme" is a unifying theme, from nanometer features and 10+ kW chips to severe materials heterogeneity. This seminar will summarize these challenges and our progress on research topics including electron and phonon transport at the transistor level, nanostructured packaging materials, and microfluidic two-phase heat sinks. This talk will also highlight two decades of collaborations with the semiconductor industry and silicon valley startups.

#### BIO SKETCH

Ken Goodson is the Bosch Chairman of the Mechanical Engineering Department and the Davies Family Provostial Professor at Stanford University. His lab has graduated 40 PhDs, nearly half of whom are professors at schools including MIT, UC Berkeley, and Stanford. Goodson studied at MIT (PhD 93) and is a Fellow with ASME, IEEE, APS, and AAAS. Recognition includes the ASME Kraus Medal, the Heat Transfer Memorial Award (Science), the THERMI Award, plenary lectures at INTERPACK, IOTHERM, PHONONS, SEMITHERM, and THERMINIC, and best/outstanding paper awards at SEMITHERM, IOTHERM, and the IEDM. Goodson co-founded Cooligy, which built microfluidic cooling systems for the Apple G5 and was acquired by Emerson in 2006.

