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**MANTTIS – Micro-And Nano-scale Thermal Transport in Infrared Focal Plane  
Array (IRFPA) Sensors**

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**Abstract**

The aim of this project is to model, demonstrate, and develop fabrication recipes for the use of emerging dielectric materials to manage thermal performance in microelectronic systems. Such materials, specifically those featuring porous silica-based morphologies (e.g., aerogels), have received significant attention in recent years due to their low dielectric constant ( $k$ ). However, their inherently low thermal conductivity has not been studied in the context of thermal management at the device level. We will consider one specific application of the technology relevant to Bridge Semiconductor, which is an infrared focal plane array (IRFPA). Low-cost, CMOS-compatible, low conductivity materials could significantly improve performance while reducing the power requirement of each application. We will also apply the work to emerging technologies of interest to Western PA companies in the fuel cell and micro-sensors industries.