

## Micro Cryogenic Thermoelectric Cooler

Figure 1 illustrates the overall structure of MEM cryogenic (below  $-150^{\circ}\text{C}$ ) thermoelectric (TE) cooler. A micro machined thermoelectric cooler is supported on a substrate and is encapsulated from the external environment using a package cap that provides vacuum encapsulation and radiation shielding to minimize thermal losses. The TE cooler can either be integrated into the support substrate or be hybrid attached. A MEMS or IC chip is mounted in the middle of the cooler and signals are transferred out using sealed feedthroughs. This proposed structure and approach will bring all of the technologies needed to enable TE coolers provide the performance needed. A major advantage of Cool MEMS is its small size and potential low cost due to the use of wafer-level packaging and fabrication technologies.

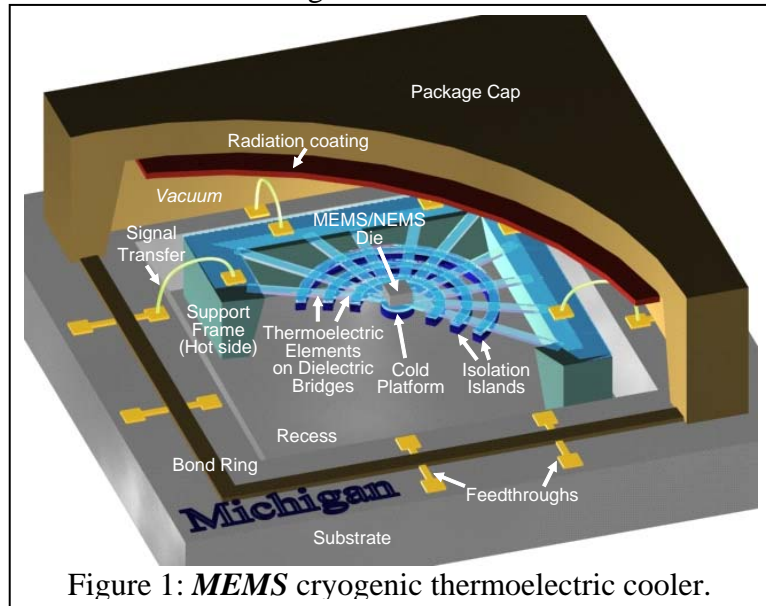


Figure 1: *MEMS* cryogenic thermoelectric cooler.