# Detecting Fatigue in Thermal Materials

**NSF Award:** NSF Industry/University Cooperative Research Center on Compact, High-Performance Cooling Technologies Research (Purdue University)

**State:** Indiana

**Congressional Districts:** Indiana District 04

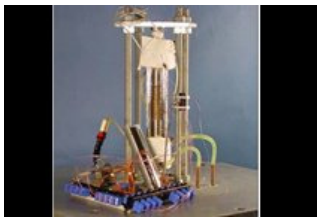
**Research Areas:** Engineering

Thermal interface materials (TIMs) are essential for keeping electronics cool and performing well. TIMs are tested for defects with a thermal probe, whose response is highly influenced by environmental conditions. To help understand where and why fatigue defects develop in TIMs, researchers at Purdue University have developed a model of the effect of thermal cycling on the material's polymer interface layers.

Mapping interface defects is important because it will help improve the materials that aid heat removal from electronic packages. Finding and documenting the evolution of defects depends on a full understanding of the thermal probe's response to changing environmental conditions. Changes in test operating conditions can dominate changes in local interface properties.

Future high-density integrated circuits will require TIMs for robust operation. An accurate model of defect development will aid in the reliable integration of organic materials into the circuits.

## Image



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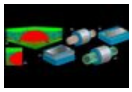

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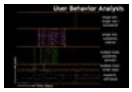
**Research Areas:** Engineering, Nanoscience
**Locations:** Indiana



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**Research Areas:** Engineering, Nanoscience, Education
**Locations:** Indiana