Compliant Thermal Interface Materials Using Graphene
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**Objective**
Develop high-performance thermal interface materials (TIMs) based on graphene

**Approach**
- **Approach 1:** Chemically exfoliated graphene oxide (reduced graphene oxide (RGO)) composites\[1\]
- **Approach 2:** Interlayer catalytic exfoliation few-layer graphene (FLG) composites\[2\]

**Experiment**
RGO/polystyrene composites \[1, 3\]

### Plot 1
- Thermal conductivity (W/m-K) vs. Filler concentration (vol.%)

**Impact**
- Thermal interface resistance ($R_{\text{int}}$) between copper and 5 vol.% FLG/epoxy composites is measured to be $\sim 5 \text{ mm}^2\text{K/W}$ at RT.
- R$_{\text{tot}}$ = 2R$_{\text{int}}$ + R$_{\text{bulk}}$
- Thermal conductivity of polymer composites can be dramatically enhanced by adding graphene fillers (e.g. $\sim 800\%$ enhancement with 5 vol.% FLG prepared by interlayer catalytic exfoliation (ICE))\[2\]).
- $R_{\text{int}}$ of FLG/epoxy composites is comparable to state-of-the-art TIMs.

**References**