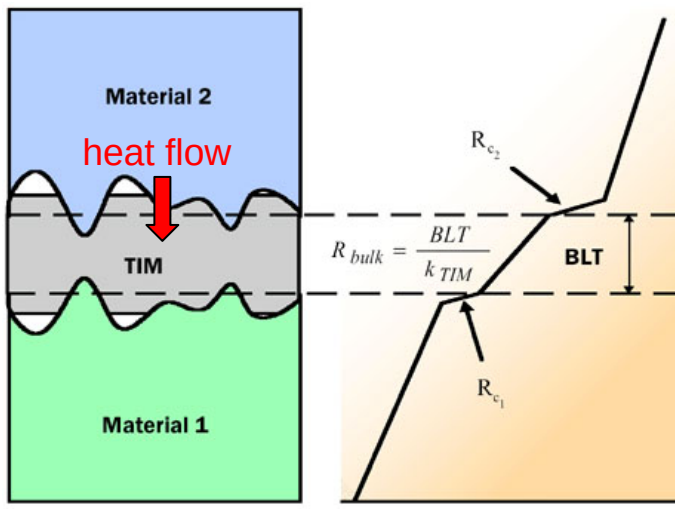
Objective

- Model the thermal resistance of particle-laden fluidic thermal interface materials



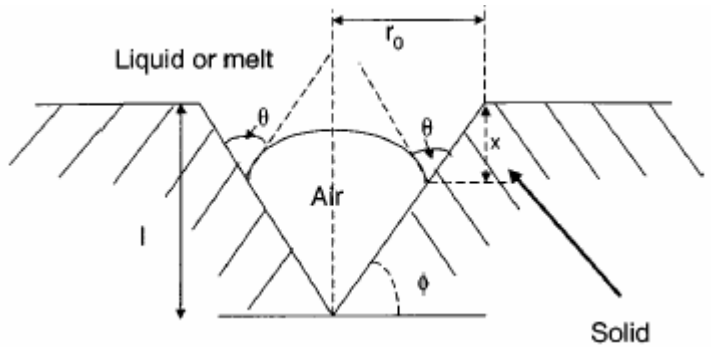
$$R_{TIM} = \frac{BLT}{k_{TIM}} + R_{c_1} + R_{c_2}$$

Questions which must be addressed:

- What is the bond-line thickness?
- How do effects such as applied load, surface wetability, and adhesion affect the thermal resistance phenomenon?

Literature Survey

- Ravi Prasher[1] has presented the first (*and only*) analytical model for the prediction of thermal resistance for these materials



- His model accounts for the effect of surface wetability with a simplified surface roughness model

Fundamentals

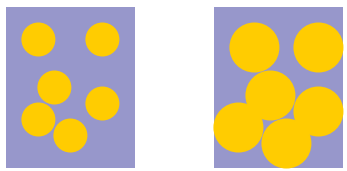
- Viscoelasticity
- Non-newtonian fluid behaviour
- Surface tension and capillarity
- Adhesion
- Composite properties (such as the effective thermal conductivity of a grease)

[1] Surface Chemistry and Characteristics Based Model for the Thermal Contact Resistance of Fluidic Interstitial Thermal Interface Materials, 2001

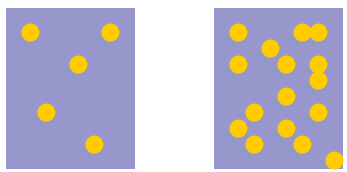
Thermophysical Properties

- What will we likely need to know about the TIM to properly formulate the model?

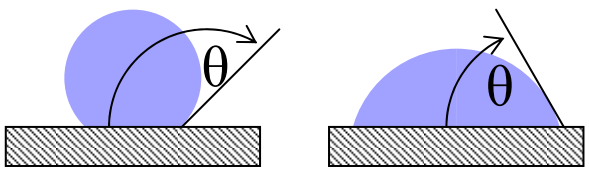
✓ Particle size



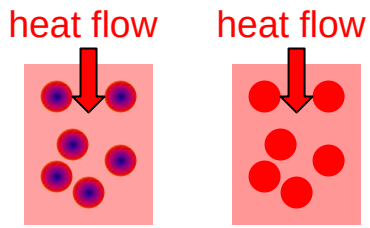
✓ Volume fraction



✓ Surface tension



✓ Effective thermal conductivity



✓ Viscosity