Thermal Energy

In-plane thermal conductivity measurement

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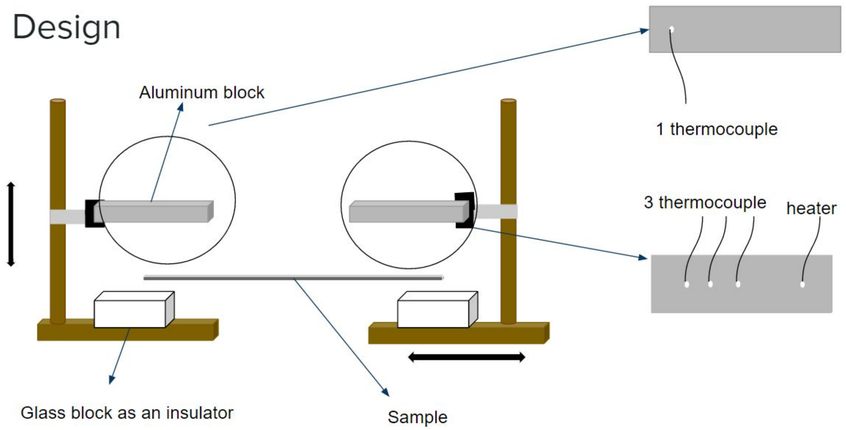
Background

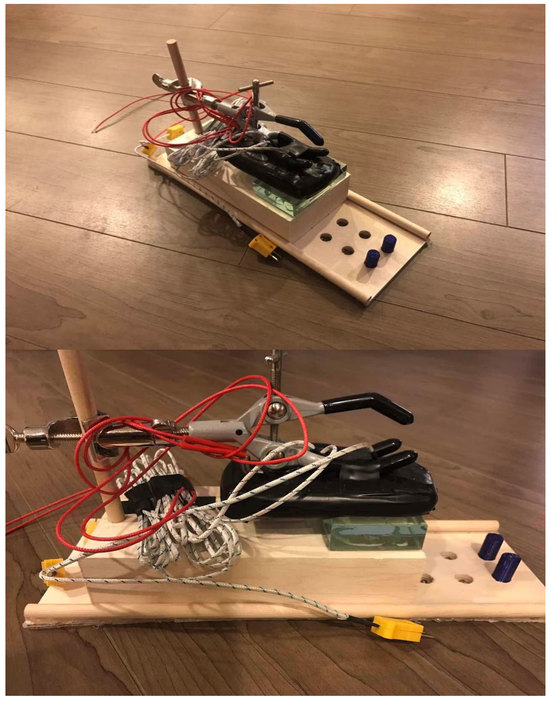
- Through-plane heat conduction measurement in professor's lab
- Expensive device in the market
- Concept of heat flux and heat conduction.
- New project starting this quarter working in conjunction with Li-ion battery project.

Goal/objectives

Design a thermal conductivity measurement device for in-plane direction.

Design/prototype





Requirements

- The device will then be used for undergraduate research project to measure CNT paper and other sheet of materials.
- ~$150 materials

Equations/measurements

❑ Equation for heat conduction

Heat flux = thermal conductivity * (change in temperature/ change in distance)

❑ Heat flux

With known value of aluminum thermal conductivity and measurement of temperature from the thermocouples on the same block, heat flux can be calculated.

❑ Thermal conductivity of the sample

Having the same heat flux through the sample, the temperature measurement from two different blocks and the distance of two blocks will give the heat conductivity of the sample.

TImeline

Week 1	Research
Week 2	Gather information
Week 3	Generate ideas
Week 4	Discuss Solution
Week 5	Finalized Design
Week 6	Order Material
Week 7	Start Building Prototype
Week 8	Test Prototype