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Research Area: Cryogenic Materials Characterization and Optimization

Motivation

Advancements in electronics technology that operate at cryogenic temperature require the study of thermal properties of the materials and interfaces used to connect these systems to a source of cooling.

A few properties of a common material, Oxygen Free High Conductivity (OFHC) copper, that is used as this heat path will be studied. These properties include the bulk thermal conductivity that occurs through the solid material and the thermal contact resistance that occurs at interfaces.

The goal for this work is to continue to grow the knowledge in this area in order to help guide the design of heat paths used in the precise thermal management of cryogenic devices.

Objectives

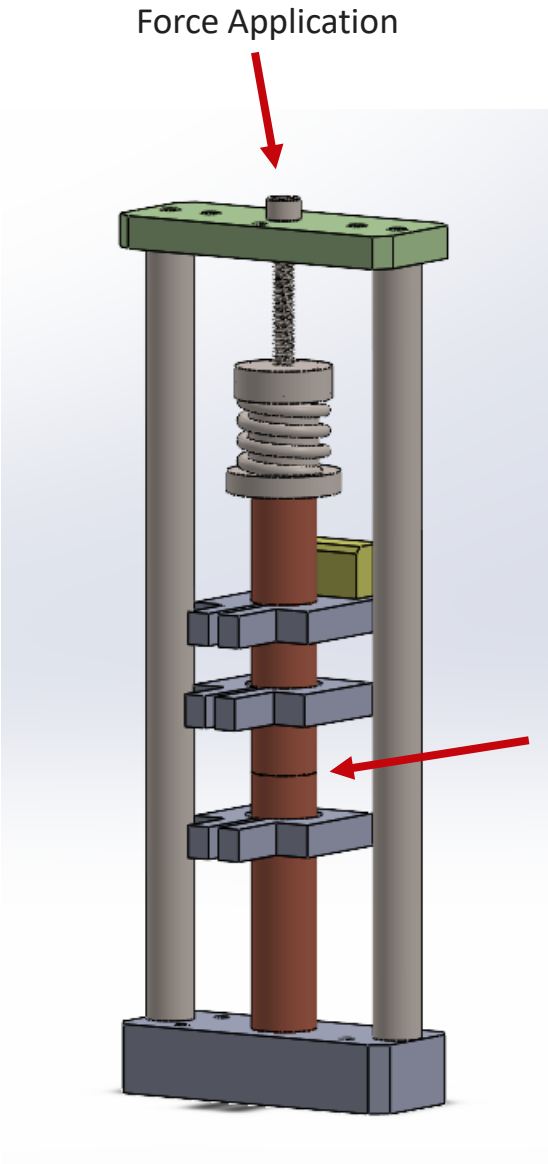
1. Expand the single cycle test matrix.

Thermal bulk conductivity: tests will be performed on samples sourced from a few different commercial vendors.

Thermal contact resistance: tests will be performed on copper samples with gold plated contact interfaces over a range of applied forces.

2. Design and demonstrate a thermally optimized contact.

FEA simulation tools will be used to analyze and optimize a bolted contact. This simulation analysis will then be followed by physical testing of the optimized contact.



Contact Resistance Sample Holder