LED in Liquid Nitrogen

Purpose

To introduce electron band theory and semiconductors using an LED and to show how changing the bandgap in a semiconductor (via submersion in liquid nitrogen) also changes the energy that electrons release as they pass the gap, visible by a change in LED color.

Materials

Liquid nitrogen

Small dewar

LED

Alligator wires

Stick

DC Power supply

Procedure

1. Attach the LED securely to the stick and connect the alligator wires to the LED and the power supply
2. Prepare a small dewar filled with liquid nitrogen
3. Turn on the power supply and submerge the LED in liquid nitrogen – the color should change

References:

Saint Mary's University - https://www.demos.smu.ca/index.php/demos/e-n-m/5-led-in-liquid-nitrogen

Disposal

Liquid nitrogen dewar should be left in the hood to evaporate. LED may need to be replaced before next use.