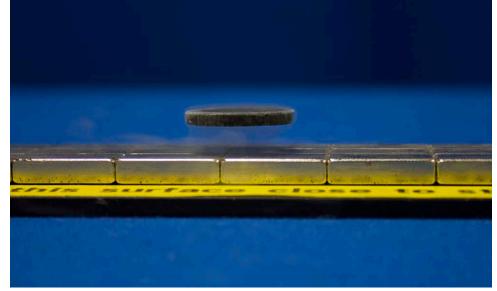
# **MEISSNER EFFECT**

### Electricity and Magnetism

Magnetic Materials

Temperature and Magnetism

5G50.50



## Concept:

Liquid nitrogen at 77° K cools the wafer composed of bismuth strontium • calcium copper oxide (BSCCO) until it becomes superconducting. In this • state, the wafer will expel from its interior, the magnetic flux from the array of permanent magnets located beneath the wafer. This is the • Meissner effect. In order to cancel the magnetic field within its interior, • the superconductor must generate electric currents at its surface. These surface currents in fact create a mirror image of the permanent magnet and thus exert a repulsive force on the wafer, causing it to levitate. Potential • applications of the Meissner effect include magnetic levitation of trains (see <a href="http://en.wikipedia.org/wiki/Maglev">http://en.wikipedia.org/wiki/Maglev</a> (transport)).



# Equipment:

- Liquid Nitrogen in Dewar
- Neodymium Magnet Sheet
- Styrofoam Dish
- BSCCO Superconducting Disc (Bismuth Strontium Calcium Copper Oxide)
- Non-Magnetic Tweezers

# Procedure:

- 1. Use the tweezers to place the superconducting disc in the Styrofoam dish.
- 2. Poor enough liquid nitrogen in the Styrofoam dish to cover and cool the superconducting disc.
- 3. Use the tweezers to gently place the superconducting disc floating above the magnets.
- 4. Use the tweezers to gently push the superconducting disc side to side over sheet of magnets. Notice that it stops when reaching the edges of the magnetic sheet.