Limited liability company

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Meissner Effect (a simple YBCO superconductor)

We present to your attention a kit for demonstrating the Meissner Effect.

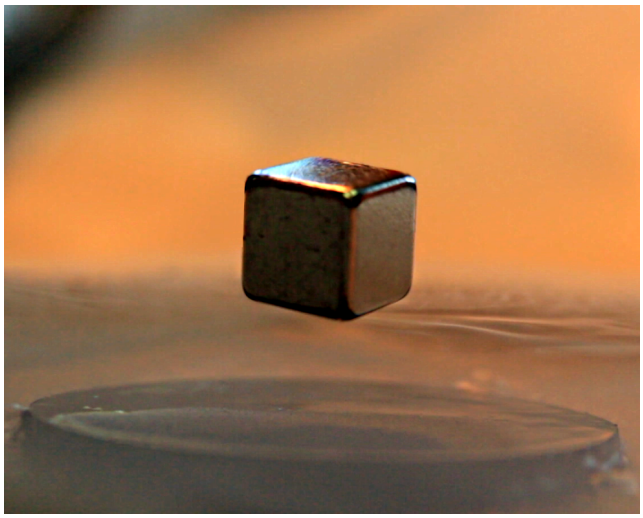

Photo Levitation

The Meissner Effect Kit includes:

- a simple **YBCO superconductor** disk 30x5mm. - 1pcs.
- plastic container - 1pcs.
- neodymium magnet 10x10x10mm. - 1pcs.
- non-magnetic tweezers - 1pcs.
- instructions with explanations - 1pcs.

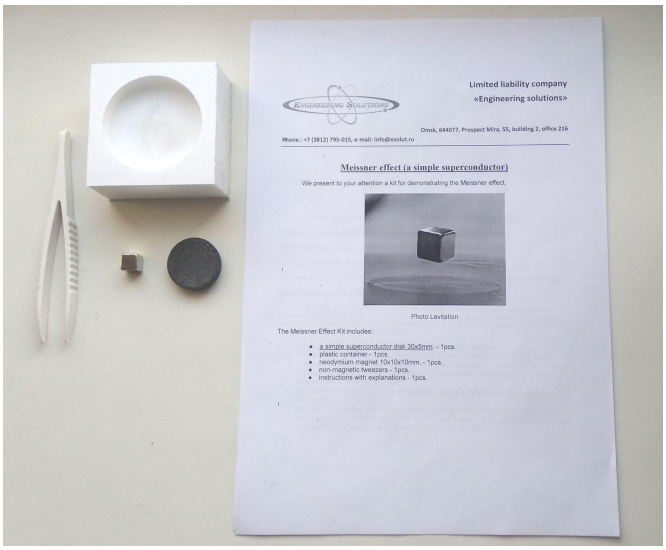

Photo of the kit

To demonstrate the effect, you need to purchase liquid nitrogen in your area.

What is a superconductor?

Superconductors are materials that satisfy two criteria:

1) the electrical resistance in the superconductor is zero;

2) the magnetic field inside the superconductor is zero - the superconductor is an ideal diamagnet.

Demonstration of the Meissner Effect (a simple YBCO superconductor)

The Meissner effect is that a constant magnetic field is pushed out of a superconductor. Since the magnetic field inside the superconductor is zero, there must be a source of the opposite magnetic field. This source is the superconducting current. Because of the perfect diamagnetism, a magnet can levitate above a superconductor.

1. Place a simple superconductor in the center of the container for cooling.
2. Fill with liquid nitrogen and wait for the superconductor to cool (nitrogen will stop boiling)
3. Take a small magnet and try to suspend it above the superconductor. Since the system may be unstable on the first try, we recommend pressing the magnet slightly against the superconductor.
4. The magnet levitates above the superconductor. Here, there is a repulsive force between the superconductor and the magnet.
5. Try pressing a magnet against the surface of a simple **YBCO superconductor** and observe the insignificance of the repulsive force. (Note: There is also a **domain superconducting ceramic** that can demonstrate “**quantum locking** and **levitation force power**”)

Additional Information

High-temperature superconducting ceramic YBCO is a material consisting of small crystallites sintered together into a single product.

In simple superconducting ceramics ($YBa_2Cu_3O_{7-x}$), all crystallites are superconducting, have the same composition, and are also randomly distributed throughout the volume, due to which only the Meissner effect is observed in it and there is no **quantum locking** effect.

Domain superconducting ceramics ($Y_{1.8}Ba_{2.4}Cu_{3.4}O_{7-x}$) consists of crystallites of different composition, both superconducting and not, in addition, in such ceramics, all crystallites are ordered in a certain way in one direction (forming a domain), which creates an additional **magnetic field trapping effect** ("**quantum locking**") and significantly enhances the **levitation force**.