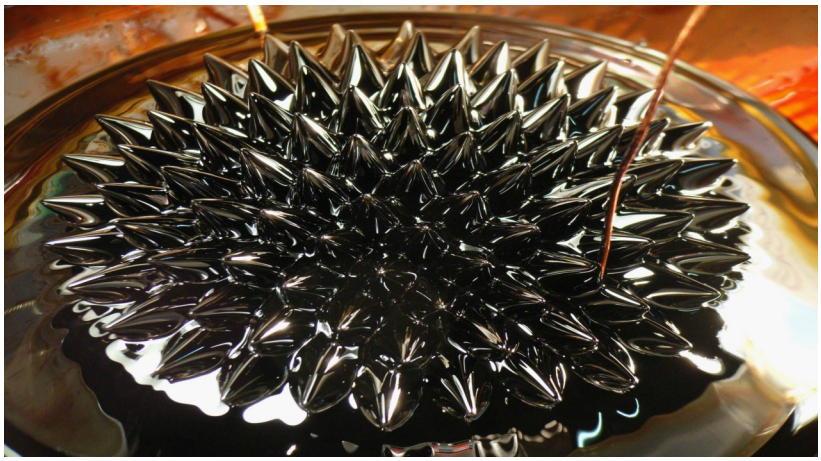
SENIC—Nanoscale Science and Engineering Exploring Magnetic Nanoparticles

Explore!

1. Pick up container 1 and place the magnet on top. Turn the container over and then upright (keep magnet on top). What happens?
2. Pick up container 2 and place the magnet on top. Turn the container over and then upright (keep magnet on top). What happens?
3. Pick up container 3 and place the magnet **under it** and move it around. Do not tilt or turn over container. What happens?
4. Pick up container 4. Can you see the penny in the liquid? Place the magnet **under the container**. Do not tilt or turn over container. What happens to the penny?



http://tesladownunder.com/Ferrofluid.htm Creative Commons

Ferrofluids: Magnetic Nanoparticles

Ferrofluid is a unique material that has both magnetic and liquid properties. A ferrofluid is a colloidal mixture of nanosized particles (10nm) of typically iron oxide (magnetite). It consists of solid particles suspended in a liquid.

Ferrofluid is paramagnetic—a nanoscale property. Nanoscale ferromagnetic materials will only become strongly magnetized in a magnetic field. When there is no magnetic field, the ferrofluid appears as metal particles suspended in a liquid. When near a magnet, the particles become temporarily magnetized and form structures in the fluid.

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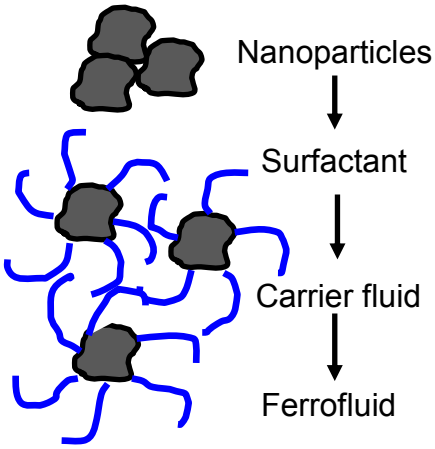


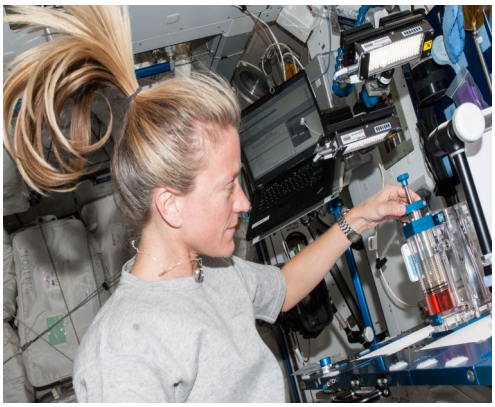
Ferrofluid was discovered by NASA in the 1960s while they were trying different methods to control liquids in space.

A surfactant (oleic acid, citric acid, soy lecithin) is used to coat the nanoparticles to prevent them from accumulating into clumps that would be too heavy to stay in suspension.

http://commons.wikimedia.org/wiki/File:Infinit

Used in speakers to keep parts cool and sealed.

Ferrofluids are used in space



http://spaceflight.nasa.gov/gallery/images/station/

MRI - magnetic resonance imaging

Computer hard disc drive - seals drive to keep particles out.

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