

Investigation 7: Practical Applications

Supplies

paper
colored pencils
markers

Teacher Notes

Because of its ability to be trained and because Nitinol's transition temperature can be manipulated, it has a wide range of useful applications. Applications of Nitinol include eyeglass frames, golf clubs, coffee pot thermostats, electrical connectors, aircraft de-icers, solar collectors, clamps, sculptures, and structural damping elements, which are used to lessen the damage caused by earthquakes. For the practical joker, a magic spoon that bends when placed into a hot beverage cup also exists. The biocompatibility of NiTi allows it to be used in medical applications such as vascular stents for holding arteries open, anchors for attaching tendons to bone, medical guide wires, medical guide pins, root canal files, bendable surgical tools, and devices for closing holes in the heart as well as the common archwire for braces. Research that uses memory metal to deploy solar arrays, to create antennae on satellites and to control the balance on helicopter rotor blades is underway. Currently, these as well as many other uses are being developed. The following MRSEC website has detailed product information on many of these uses: <http://mrsec.wisc.edu/EDETC/memmetal/index.html>.

In this investigation, students brainstorm possible inventions using memory metals. Each team of students should develop the idea and produce a poster of this idea. Students' ideas in my classroom have been very creative. These ideas include memory metal hair weaves that curl or straighten when heated with a hair dryer, a memory metal Slinky that won't bend and kink, a memory metal safety toy that sends up a small flag if bath water is too hot. To help students get started, it may be useful to provide several examples of existing applications of memory metals. However, students should not be given too many examples since that may make it difficult for students to come up with their own original ideas. Individual, small group, and large group brainstorming sessions are useful for coming up with possible invention ideas. When they have completed the work with their own ideas, it might be interesting for students to visit the MRSEC website and explore various memory metal products now available or under development.