

SMART MATERIALS

Key Revision Facts: GCSE Technology

Smart materials have one or more properties that **change reversibly** in a controlled fashion when an external stimuli is applied.

Piezoelectrics

Piezoelectric materials convert electrical energy to mechanical energy, and vice versa. Common applications for piezo materials are BBQ igniters and actuators for inkjet printer heads.

Shape Memory Polymers

Shape memory polymer is a polymer that can be bent out of its original shape and then returned to its original shape when heated.

Shape Memory Alloys

Shape memory alloys are mixtures of metals that return to their original shape when heated, similar to shape memory polymers. Typically applications include thermal triggers.

Thermochromic Pigments

Thermochromic pigments change colour at specific temperatures. Examples include colour-changing novelty mugs, and forehead thermometers.

Photochromic Pigments

Photochromic pigments change colour when exposed to light. Examples include sunglasses that react to sun light.

Magnetostrictive

Similar to piezoelectric materials that respond to changes in electrical fields, this class of materials responds to changes in magnetic fields and can perform as an actuator, or sensor.

Hydrogels

Hydrogels can absorb up to 1,000 times their own volume in water. After this water has been absorbed, it can be released when its surroundings are dry. Changes in temperature or pH can also cause the hydrogel to release water.

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VERSION INFORMATION

Date	Arthur	Comment
13-Mar-2021	Andrew Seaford	Initial release.