Classification of Materials (Smart Materials)

•A smart material can be described as a material that has a useful response to external influences or stimuli.

There are many examples of smart materials in everyday use that are not modern developments they in

•Metal springs

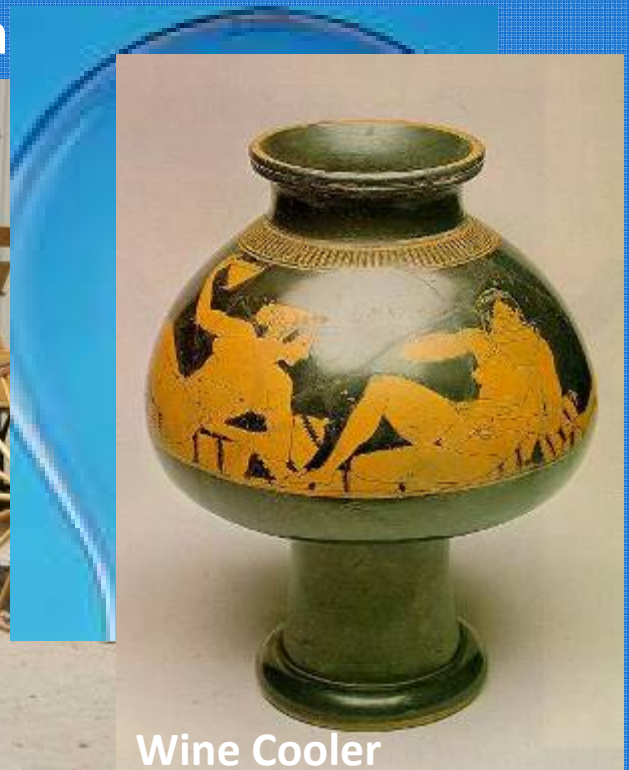
•Light bulbs self regul

The filament tempera

their resistance rises

•Ancient civilisations

porous ceramics for s



Wine Cooler

Classification of Materials (Smart Materials)

- Other more modern examples of materials include;
  - Shape memory polymers and alloys
  - Smart Wire
  - Smart Ink/Silicone
  - Smart Fluids
  - Piezoelectric Materials
  - Chameleon Colours

Heat shrink tubing and packa

Automatic actuators – open/

Actuators, linear, angular and

Thermostats for heating cont

Bimorph actuation – rotary motion betwee

Motion control gel – CD tray

Ferro fluids – earthquake dar

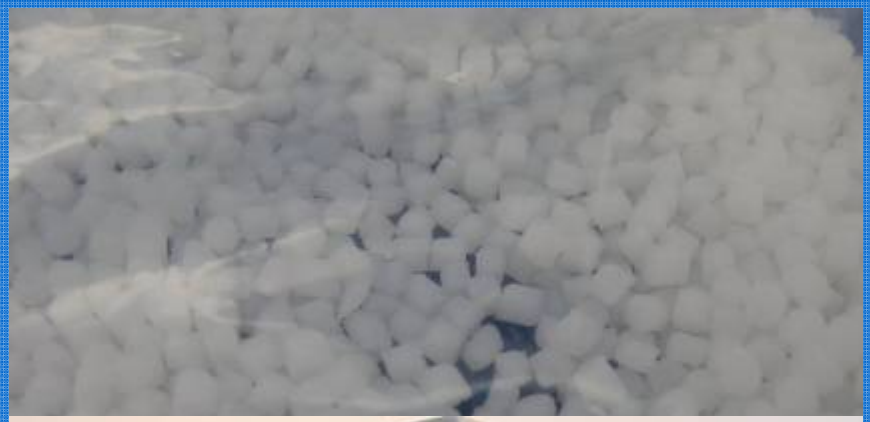
Sensors, musical cards, motor

Car paints, printing inks, packaging

Classification of Materials (Smart Materials)

- Other more modern examples of smart materials include;
- Polymorph

This is a unique polymer that fuses in hot water and can then be moulded to any form. When solid it has similar properties to nylon



Used to make the moulds for the vacuum formed seat and fuel tank of this motorcycle project

Classification of Materials (Smart Materials)

- Other more modern examples of smart materials include;
- Thermocolour Sheet

This is a self adhesive sheet whose colour changes according to the temperature. Used for thermometers, heat warning patches and novelty advertising of products

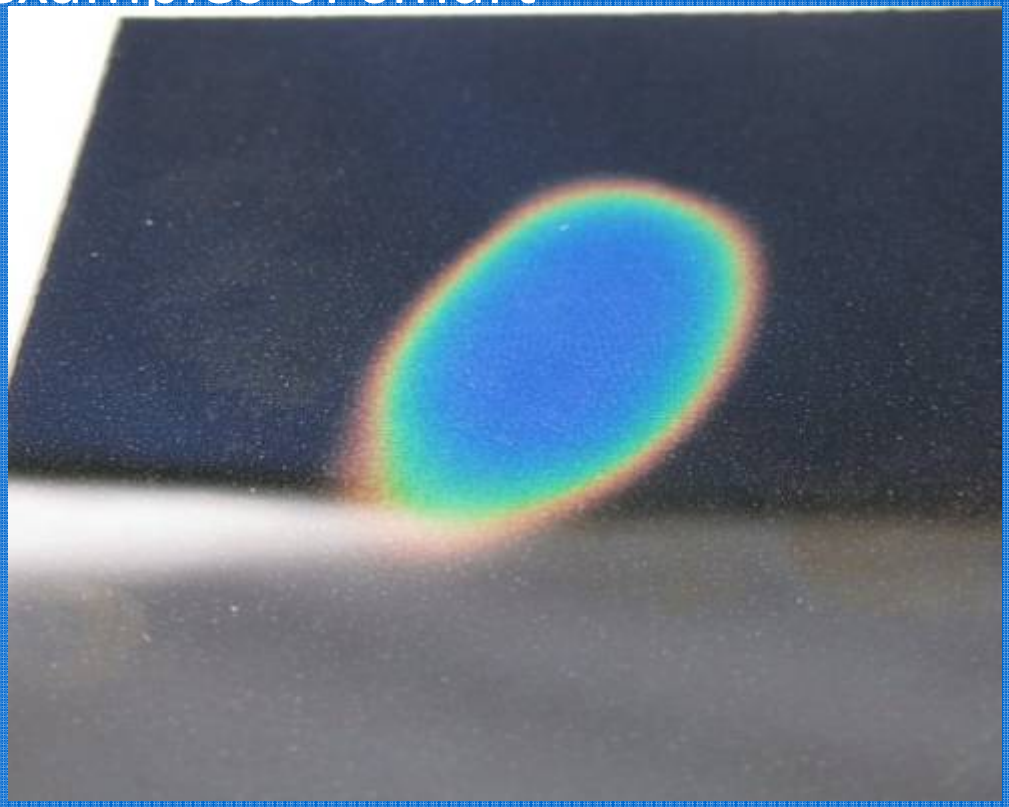
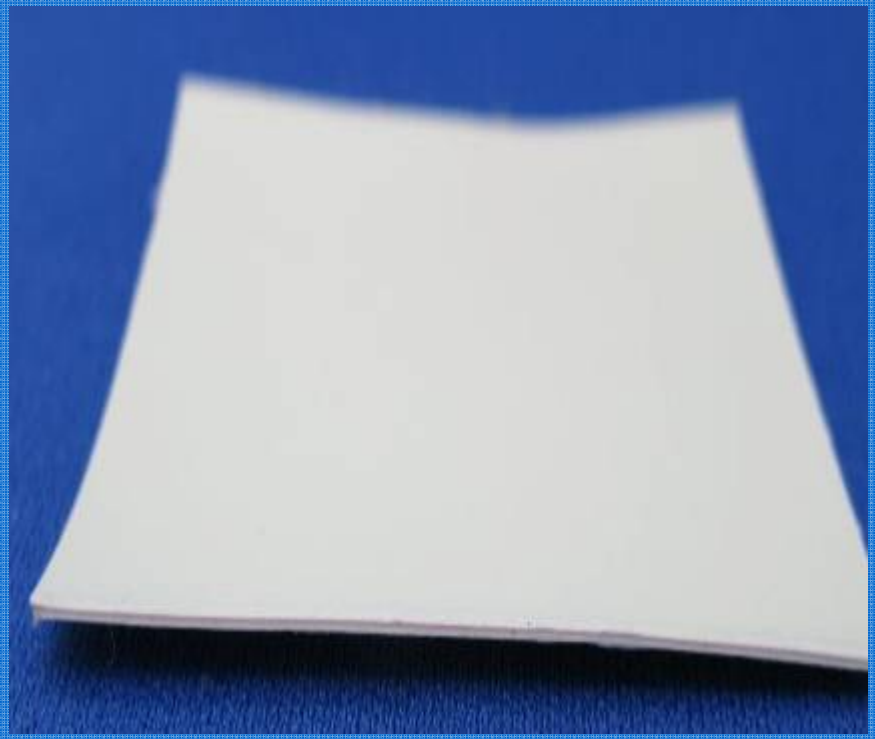


Image of Thermocolour Sheet according to temp

Classification of Materials (Smart Materials)

- Other more modern examples of smart materials include;
- Phosphorescent Sheet

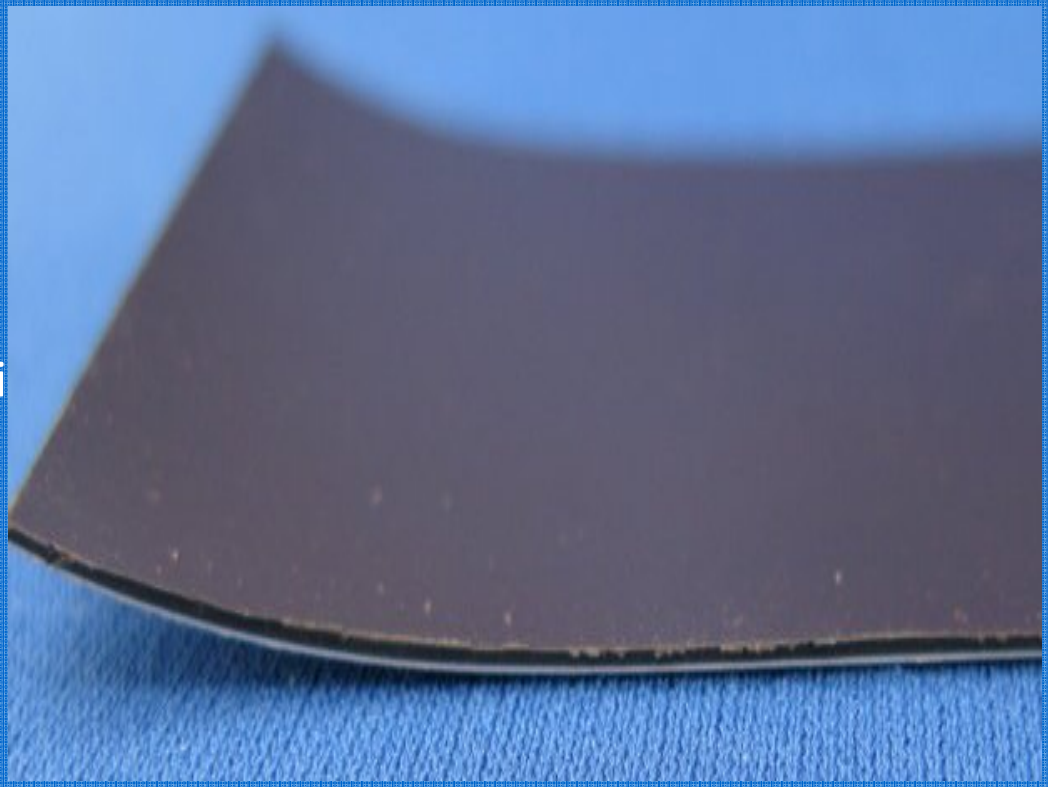
This is a sheet that absorbs light energy and re-emits it as white light for up to eight hours. Used extensively for emergency lighting in the event of a power cut



Classification of Materials (Smart Materials)

- Other more modern examples of smart materials include;
- Magnetic Sheet

This is a flat polymer magneti sheet as used in fridge magnets. Also available in thin A4 sheets that can be printed on



Classification of Materials (Smart Materials)

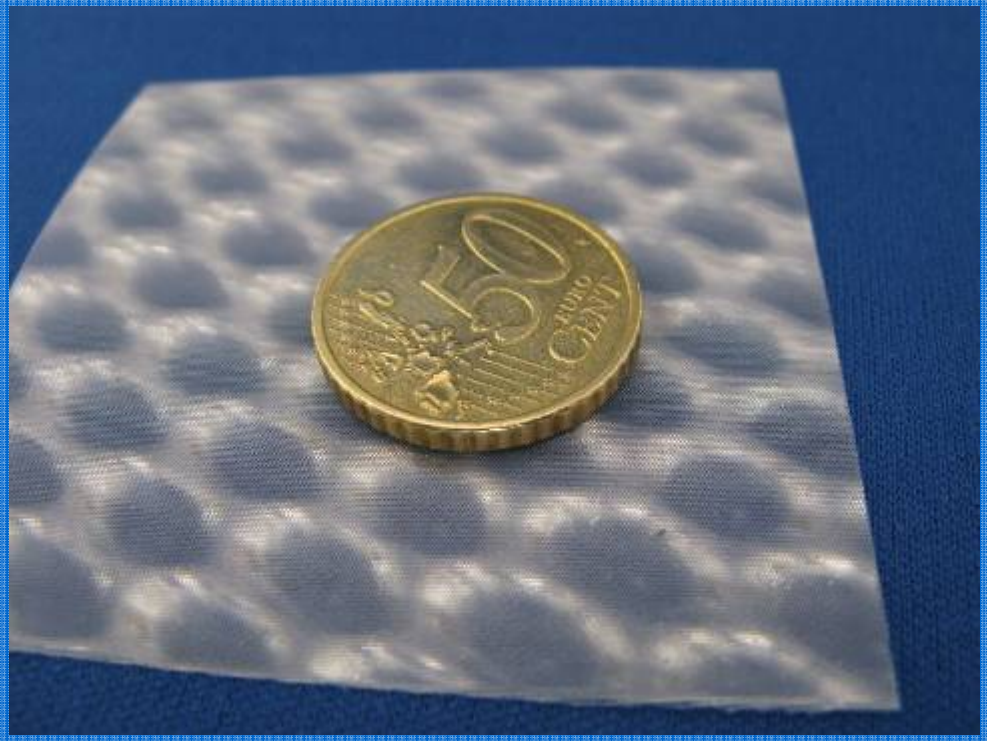
- Other more modern examples of smart materials include;
- Rigid PVC Foam Plastic

This is a new generation of sheet material used widely for signs and exhibitions. Thermoforms very well. It is widely used for ‘plug and yoke’ mouldings

Classification of Materials (Smart Materials)

- Other more modern examples of smart materials include;
- Lenticular Sheet

This sheet is about 1mm thick but gives the illusion that it is nearer to 6mm thick. An object placed on the sheet appears to sink below the surface



The camera lens does not capture the effect

Classification of Materials (Smart Materials)

- Other more modern examples of smart materials include;
- Anodised Effect Card

This is almost impossible to tell from the real thing. Ideal for project mock-ups. It is relatively cheap and cuts easily with a scissors or craft knife

Classification of Materials (Smart Materials)

- Other more modern examples of smart materials include;
- Galvanised Effect Card

This is almost identical to the real thing. Ideal for project mock-ups. It is relatively cheap and cuts easily with a scissors or craft knife. Used for packaging of top branded goods

Classification of Materials (Smart Materials)

- Other more modern examples of smart materials include;
- Quantum Tunnelling Composite (QTC)
  - A QTC in its normal state is a perfect insulator
  - When compressed it becomes a perfect conductor
  - If only lightly compressed its conductivity is proportional to the pressure applied

  How does it work?

  In normal physics an electron cannot pass through an insulation barrier.

  In Quantum physics theory a wave of electrons can pass through an insulator – this is what is happening!

Classification of Materials (Smart Materials)

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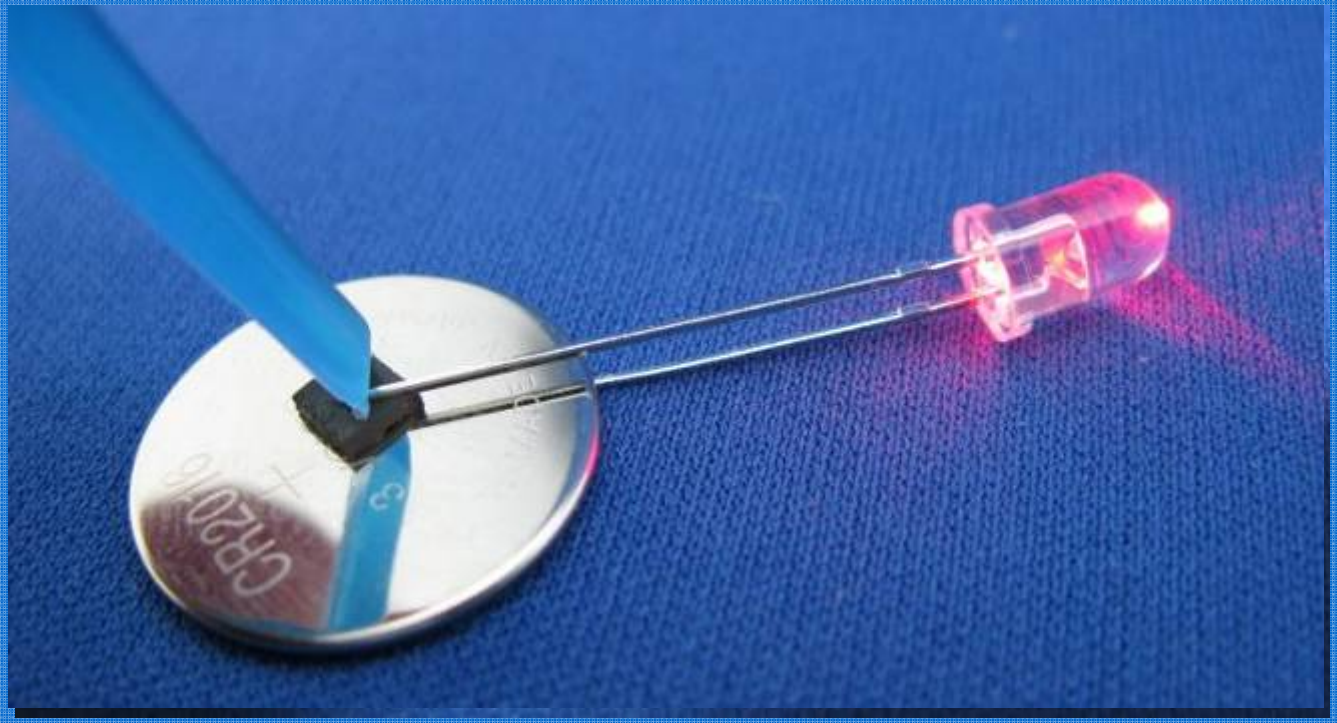
- Quantum Tunnelling Composite (QTC)

Classification of Materials (Smart Materials):

- Other more modern examples of smart materials include;

Quantum Tunnelling Composite (QTC)



Before pressure is applied

Light Pressure being applied