Smart materials

Shape memory alloy *(SMA) (Deformed then returns to original shape):*

Advantages	*Disadvantages*
• Good mechanical properties • Resistant to typical spectacle damage (e.g. being sat on) • Flexible • Lightweight • Durable	• Expensive • Can be overstressed • Poor fatigue properties • Difficult to repair

Uses: Braces, Spectacles, Planes, Tweezers

Reactive glass *(Reacts to external shape to change properties of glass):*

Advantages	*Disadvantages*
• Multi-use • Reacts to environment • Provides shade from harmful UV rays • No needs for blinds/curtains in houses • Allows control of natural light levels • Can be used as energy saving windows	• Needs an external stimulus to work

Uses: Masks for electric arc welding, glass panels instead of blinds

Phosphorescent pigment:

Advantages	*Disadvantages*
• Can absorb light energy and remit it • Can be used in toys/products • Relatively inexpensive	• Undetermined brightness • Undetermined length of light emittance

Uses: Fire exit signs, glow in the dark products, watch hands

Electroluminescent wire:

Advantages	*Disadvantages*
• Safe/does not run hot • Responds to stimuli (alternating current) • Compact/Flexible/Adjustable	• Can be expensive for long lengths • Can cause electric shocks during installation

Uses: Stage lighting, Neon signs

Photo-chromic materials (Change colour depending on light conditions):

Advantages	*Disadvantages*
• Multiple uses • Reacts to environment • Reversible reaction	• Expensive • Sometimes don't fully react

Uses: Sunglasses, Security sensors, UV light warning sensor

Thermo-chromic materials *(Change colour depending on temperature):*

Advantages	*Disadvantages*
• Multi-use • Reacts to environment • Broad range of colour	• Expensive • Hard to make • Sometimes doesn't fully react • Takes time to fully react

Uses: Baby spoons, Coffee mugs, Battery's (charged or not)

Quantum tunnelling composites *(QTC):*

Advantages	*Disadvantages*
• Good electrical insulator and conductor • Flexible • Durable • Lightweight • Water resistant	• Relatively unknown technology • Expensive • Hard to manufacture

Uses: Power tool switches, Robots, Clothing/fabrics

Piezoelectric material:

Advantages	*Disadvantages*
• Give off electrical charge when deformed • Compact • Flexible	• Prone to water and moisture damage • Highly sensitive to temperature • Low voltage output

Uses: Airbag sensors, musical greetings cards, pressure sensors