

Smart Materials, Composites and technical textiles

Read Chapter 2 – page 23 to 29

1. Draw out and complete this table

Smart Material	Is it known by another name? If so what?	What does it react to / what does it <u>do</u>	use
Electroluminescent material	EL wire EL films	A material that provides visible light when exposed to a current	Signage, decorative lighting
QTC	no	They conduct electricity and are insulators	Speed controllers, membrane switches, mobile phones
SMA	Nitinol	A metal that can return to its original shape	Medical fastenings, braces
Polymorph	Thermoforming polymer	A material that is soft and pliable at low temperatures	In schools when modelling ergonomic features on a product
Photochromic pigment	no	Changes colour in response to light intensity	sunglasses
Thermochromic pigment	no	Changes colour in response to a change in heat	Visual indicators on applications
Micro encapsulation	no	Applying microscopic capsules to fibres or fabrics	Medical textiles, sportswear, children's clothes, household textiles
Biomimetics	Biomimicry	Taking ideas and mimicking features from nature	swimwear

2. Draw out and complete this table

Composite Materials	Full name	Properties	use
CFRP	Carbon fibre reinforced polymer	Lightweight and rigid	Sports equipment
GRP	Glass reinforced plastic	Tough and lightweight	Boats, canoes, hockey sticks
Kevlar	Dupont Kevlar	Lightweight, flexible and durable	Police body armour, sportswear

3. Find a sporting use for CFRP, GRP and Kevlar
Track bikes.

4. Draw out and complete this table

Technical Textiles	Properties	use
Interactive textiles	Contain a device or circuit that responds and reacts with the user	Heart monitors, GPS tracking systems, performance monitors
Microfibres	Fine synthetic fibres	Cleaning cloths, clothes

Phase change materials	Encapsulated droplets on fibres that change between liquid to solid form within a temperature range	Space suits, clothes
Breathable fabrics	Waterproof, windproof fabrics	Clothing, footwear
Rhovyl	Non-flammable, crease resistant	Underwear, socks, clothing
Nomex	Strong, heat resistant	Gloves, racing car driver's clothes, fire-fighter's uniform
Geotextiles	Textiles associated with soil and various aspects of construction, drainage and support.	Controlling coastal erosion, protecting crops, linings on canals

- Dupont developed Kevlar and Nomex. What is Dupont? How long have they been in business, what does it do. What other materials have they developed?
<https://www.dupont.com/>
They make scientific discoveries about technology, 200 years.
- Why are composite materials difficult to recycle?
They are made from thermoset resins, which don't melt.
- Define a smart material
A material whose properties change in response to an external change in environment.
- Define a composite material
A material manufactured from a combination of two materials with desirable properties.