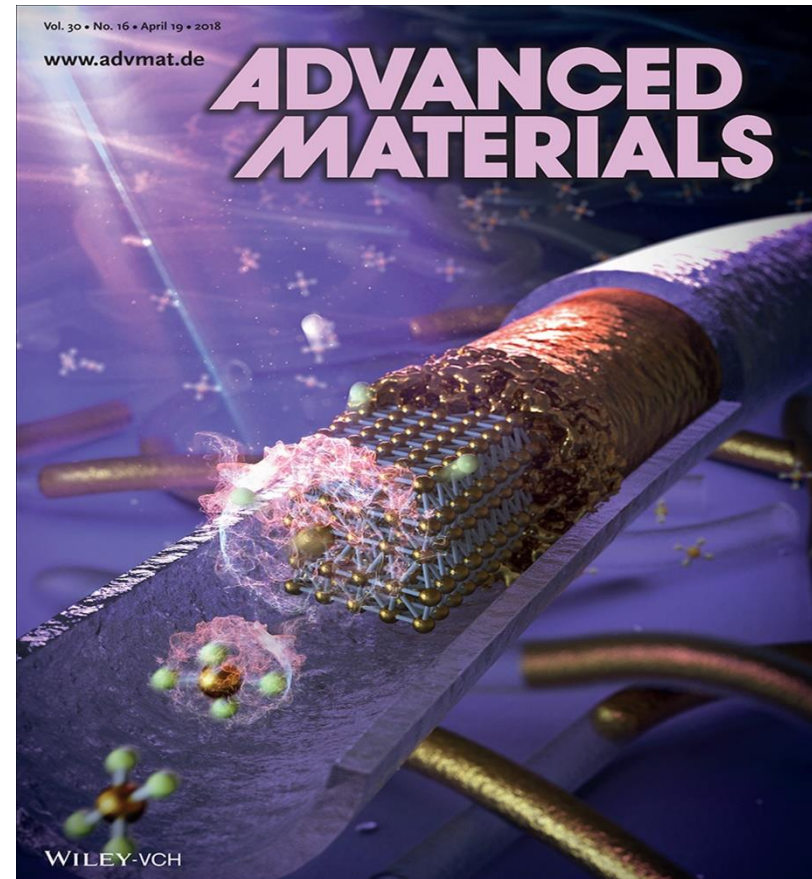


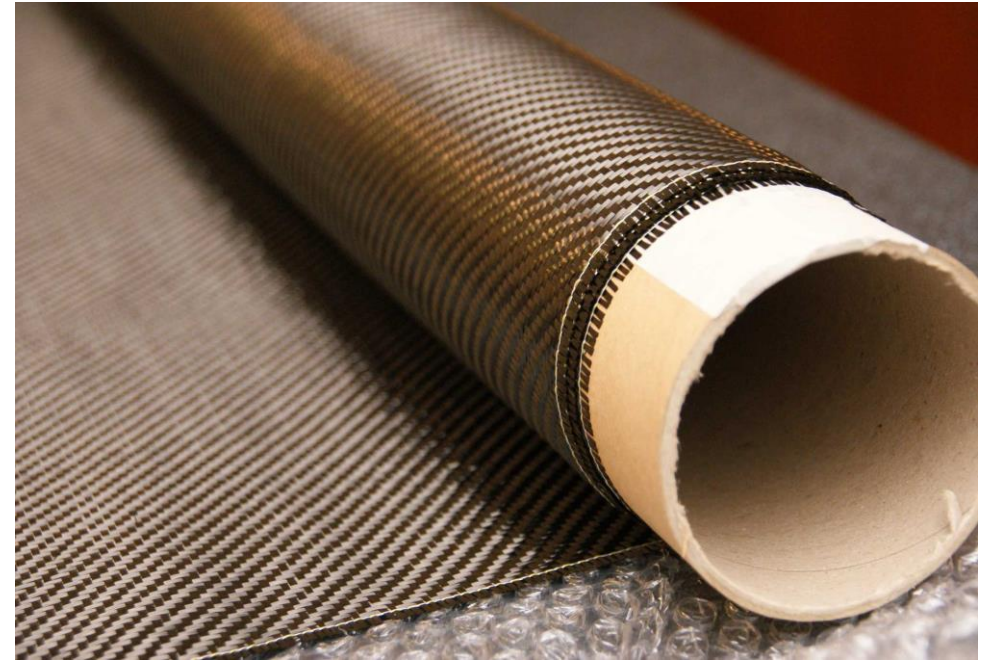
Advanced Materials

Advanced materials means developing, formulating or manufacturing advanced alloys, coatings, lubricants, refrigerants, surfactants, emulsifiers or substrates.



Composite Materials

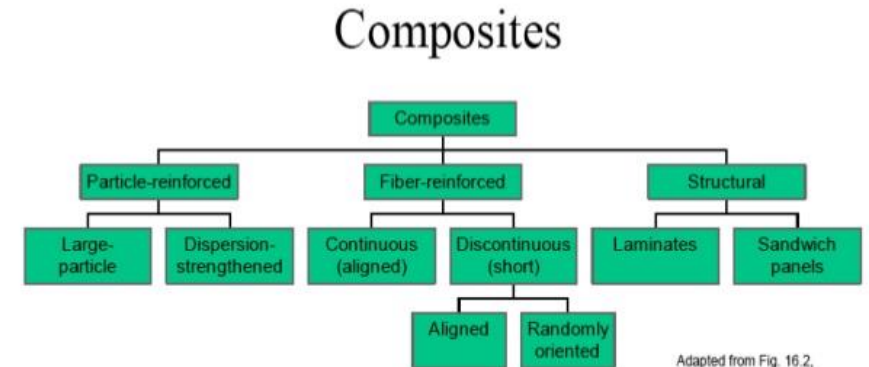
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A composite material is a material made from two or more constituent materials with significantly different physical or chemical properties. When combined, produce a material with characteristics different from the individual components. The individual components remain separate and distinct within the finished structure.



Classification

- Fiber Reinforced In this group of composites, the fiber is the primary load-bearing component.
- Dispersion Strengthened In this group, the matrix is the major loadbearing component.
- Particle Reinforced In this group, the load is shared by the matrix and the particles.

Classification based on reinforcement



Properties

A composite material is any material made by combining two or more materials in a structure whereby materials remain separate. This is done to produce materials with desirable properties such as high compressive strength, tensile strength, flexibility and hardness.

Applications

APPLICATION OF COMPOSITE MATERIAL IN AEROSPACE INDUSTRY The Composite materials are used to manufacture Rocket and Missiles motor cases. These composite materials are composites of carbon, aramid and glass.

Ceramics

Ceramic materials are inorganic, non-metallic materials made from compounds of a metal and a non metal. Ceramic materials may be crystalline or partly crystalline. They are formed by the action of heat and subsequent cooling. Clay was one of the earliest materials used to produce ceramics, as pottery, but many different ceramic materials are now used in domestic, industrial and building products. Ceramic materials tend to be strong, stiff, brittle, chemically inert, and non-conductors of heat and electricity, but their properties vary widely.

Classification

- Glasses: containers, windows, mirrors, lenses.
- Clay products: structural products (bricks, tiles, sewer pipes) and whitewares (porcelain, chinaware, pottery, etc.).
- Refractories: Thermal insulation.
- Abrasives: Diamond, silicon carbide, tungsten carbide, silica sand, aluminium oxide / corundum are some typical examples of abrasive ceramic ...
- Cements: construction brick.
- Advanced ceramics: heat engines , ceramic armors, electronic packaging, etc.

Properties

- **PHYSICAL PROPERTIES:** Physical properties are identified by its crystal structure and its chemical composition. Generally, Physical properties are ...
- **MECHANICAL PROPERTIES:**
- **CHEMICAL PROPERTIES:**
- **THERMAL PROPERTIES:**
- **ELECTRICAL PROPERTIES:**

Applications

- Applications of ceramics Ziad zohdy
- A ceramic material may be defined as any inorganic crystalline material, compounded of a metal and a non-metal .
- Ceramics can be classified as Crystalline ceramics & Non-crystalline ceramics .
- Glass-ceramic materials share many properties with both glasses and ceramics.
- Glass-ceramics have the fabrication advantage of glass as well as special properties of ceramics.

Heat insulating materials

- Thermal insulation is the reduction of heat transfer (i.e., the transfer of thermal energy between objects of differing temperature) between objects in thermal contact or in range of radiative influence. Thermal insulation can be achieved with specially engineered methods or processes, as well as with suitable object shapes and materials.