

STUDY ON CERAMICS

Ceramic are inorganic materials consisting of metallic and non-metallic elements bonded together mainly by ionic or covalent bonds. They are in the forms of crystalline, non-crystalline or mixtures of both.

Properties:

High hardness.

High temperature strength.

Good chemical resistance.

They tend to be brittle.

Low thermal and electrical conductivities.

The fundamental basis for its characteristics lies within the electronic behaviour of constituent atoms. The metallic elements release their outermost electron and give there electron to non metallic atoms which retain them. The result is that these electrons are immobilized and this situation indicates the absence of conduction electrons. Hence a typical ceramic materials act as a good insulators.

In our case, the atoms which lost outermost electrons are called positive metallic ions. Similarly, the atoms which gain electrons are called negative metallic ions. The positive metallic ions and negative metallic ions develop strong attractions for each other. Each cation surrounds itself with anions. To separate the two ceramic materials are mechanically resistance (hard), thermally resistant (refractory) and chemically inert.

Classifications:

Traditional ceramics.

Advanced ceramics.

Traditional ceramics:

The important characteristics of traditional ceramic are that all traditional ceramics use materials or minerals occurring state.

Eg:

Al_2O_3, SiO_2 China ware, sanitary ware, etc.....

Advanced ceramics:

Advanced ceramics refers pure or nearly pure ceramic components alone (or) in combination; they are manufactured by using highly refined raw materials by using several chemical techniques. Therefore the starting materials for advanced ceramics have already undergone chemical transformation and refinement.

Eg:

$SiC, Si_3N_4, BaTiO_3, ZrO_2$

Applications:

1. It is used in capacitors, electronic circuits, electronic sensors, integrated components, etc..
2. Piezo electric ceramics are used in phonograph pickups, microphones, gas lighters, quartz watches, SONAR devices.
3. Ferroelectric ceramics are used for the manufacture of capacitors.
4. Ceramic chip capacitors are used in ceramic-based thick film hybrid electronic circuits.
5. Ceramic semiconductors are used in some electrical device eg: thermister.

Source :<http://mediatoget.blogspot.in/2011/08/ceramics.html>