

## 5th Semester CERAMIC BRANCH

### 5th Chapter Lec. Note

#### TOPIC - Nano Ceramic

##### INTRODUCTION -

Nano Ceramic is a nano material. Nano material is a Nano Particle. Nano material is a microscopic Particle. A nanoparticle or ultrafine particle is usually defined as a particle of matter that is between 1 and 100 nanometers (nm) in diameters. Nanoparticles are usually distinguished from 'fine particle', sized between 100 and 2500 nm and 'coarse particles' ranging from 2500 to 10,000 nm. They are a subclass of the colloidal particles, which are usually understood to range from 1 to 1000 nm. Nano Particle is more than 85% air and is very light, strong, flexible and durable. Nanophase ceramics are ceramic that are nanophase material.

#### Properties of nano ceramic:

- (1) The fractal nanotubes is a nanostructure architecture made of alumina, or aluminum oxide.
- (2) Its maximum compression is about 1 micron from a thickness of 50 nanometers.
- (3) Ceramic nanoparticles is more than 85% air and is very light, strong, flexible and durable.
- (4) Their strength is similar to that of steel and most ceramics maintain their strength at high temperature.
- (5) Nano ceramic are brittle and rigid.

6th semester Ceramic branch

5th chapter Nano ceramic lec. Note

Topic: Introduction of Nano Technology

Nanotechnology (or "nanotech") is manipulation of matter on an atomic, molecular, and supramolecular scale. The earliest widespread description of nanotechnology referred to the particular technology goal of precisely manipulating atoms and molecules for fabrication of macroscale product, also now referred to as molecular nanotechnology.

Nanotechnology as defined by size is naturally very broad, including fields of science as diverse as surface science, organic chemistry, molecular biology, semiconductor physics, energy storage, microfabrication, molecular engineering etc. Nanotechnology may be able to create many new materials and device with a vast range of application, such as in nanomedicine, nanoelectronic, biomaterials, energy production and consumer products. On the other hand, nanotechnology raises many of the same issues as in any new technology, including concern about the toxicity and environmental impact of nanomaterials and their potential effect on global economies, as well as speculation about various doomsday scenarios.

6th semester ceramic branch

5th chapter Nano ceramic lec. Note

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6<sup>th</sup> Semester Ceramic Branch

5<sup>th</sup> Chapter Nano Ceramic Lec. Note

Topic: INTRODUCTION of Nano material

Nanomaterials describe, in principle materials of which a single unit small sized (in at least one dimension) between 1 and 100 nm. (the usual definition of nanoscale) nanomaterial research takes a materials science based approach to nanotechnology. Emerging advanced in materials metrology and synthesis which have been developed in support of microfabrication research materials with structure at the nanoscale often have unique optical, electronic or mechanical properties. Nano material is defined as the "material with any external dimension in the nanoscale or having internal structure or surface structure in the nanoscale", with nanoscale defined as the "length range approximately from 1 nm to 100 nm." This include both nano-object, which are discrete piece of material and nanostructured materials. which have internal or surface structure on the nanoscale a nanomaterial may be a member of both these categories. Nano material are used in a variety of manufacturing processes, paints and healthcare including paints, filters, insulation and lubricants additives. In healthcare including paints, filters, insulation and lubricant. In paints nanomaterials are used to improve UV protection and improve ease of cleaning. High quality filters may be produced using nanostructure, these filters are capable of removing particulates.