

# Unique Properties of Nanomaterials

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## ARTICLE DETAILS

### Article History

Published Online: 16 Mar 2020

### Keywords

Nanomaterials, very useful, In clothing to sunscreen.

## ABSTRACT

The unique properties of nanomaterials are attributed to quantum effects, larger surface area, and self assembly. Nanomaterials have become widely used in products ranging from clothing to sunscreen. They are very useful but there is insufficient information about how nanomaterials affect ecosystem health.

## 1. Introduction

The unique properties of nanomaterials are attributed to quantum effects, larger surface area, and self assembly. It is possible for humans to create materials that include nano forms and we do that more and more because they have some advantages that substances in bigger sizes do not have. In case of bulk material the intrinsic Physical properties (ex. density, connectivity, etc) are Independent of the size and shape of the material. In the case of nanomaterial intrinsic Physical Properties depends upon its size and shape and processing condition in which the materials are built for eg :- in the case of carbon nanotube which are of two types metallic and semi-conducting. The energy gap of the semiconducting carbon nanotube varies with the diameter. Energy gap reduces with the increase of tube diameter.

Apart from these nano structure materials exhibits some exotic phenomenon like :-

1. Quantum confinement -Here most of the electrons are restricted in 1, 2 and 3 dimensions and energy levels are quantise, we can directly apply quantum mechanics to the dynamics of quantum mechanic and quantum mechanics helps us determining the dynamics of electrons of this system .

2. coherence and Decoherence- Nanomaterials exhibit coherence and decoherence which helps us to understand the behaviour of the wave function whether they are in the same phase or outer phase. It is the first phenomenon which are seen together in nanomaterial. Such phenomenon are not seen in case of bulk materials.
3. surface /Interface effects- Nano structure materials show surface/Interface which was not observed in bulk materials. A significant fraction of atoms are located near the interface of the materials which alters its thermodynamics and optical properties which were not seen earlier in bulk material.

Nanomaterials have become widely used in products ranging from clothing to sunscreen. nanomaterials are very useful, but there is insufficient information about how nanomaterials affect ecosystem health.

Since nanomaterials are much smaller than normal, they are absorbed more easily by animals lungs and skin. EPA is in the process of researching as how nanomaterials interacts with biological processes Important to the health of ecosystems and wildlife species that live in these ecosystems.

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