

An overview of some properties, applications and methods of Al_2O_3 nanoparticles synthesis

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ABSTRACT

Nanotechnology could be defined as the technology that has allowed for the control, manipulation, study, and manufacture of structures and devices in the “nanometer” size range. These nano-sized objects, e.g. “nanoparticles”, take on novel properties and functions that differ markedly from those seen from items made of identical materials. Metallic oxide nanoparticles have recently been of great interest for many various industries and medical purposes. Among them, aluminum oxide (Al_2O_3) and its compounds have long been known formore than a century, for example, aluminum oxide hydroxide ($AlOOH$) and aluminum trihydroxide ($Al(OH)_3$). This article presents an overview of Al_2O_3 nanoparticles, properties, applications and methods of it's synthesize.

Keywords

Nanotechnology; Metallic oxide nanoparticles; Al_2O_3 nanoparticles; methods of Al_2O_3 nanoparticles synthesis.

1. INTRODUCTION

Nanotechnology is the science that deals with matter at the scale of 1 billionth of a meter (i.e. $10^{-9} \text{ m} = 1 \text{ nm}$), and is also the study of manipulating matter at the atomic and molecular scale. [1].It is expected that nanotechnology will be developed at several levels: materials, 1devices and systems. The Nano materials level is the most advanced at present, both in scientific knowledge and in commercial applications. A decade ago, nanoparticles were studied because of their size-dependent physical and chemical properties [2].A nanoparticle is the most fundamental component in the fabrication of a nanostructure, and is far smaller than the world of everyday objects that are described by Newton ' s laws of motion, but bigger than an atom or a simple molecule that are governed by quantum mechanics The United States instituted the National Nanotechnology Initiative (NNI) back in 2000, which was soon followed (2001) by a plethora of projects in nanotechnology in nearly most of the U.S. Departments and Agencies [3].The shortest definition of nanoparticles [4-6],

– Origin: (Natural or Anthropogenic)

– Size (as already shown): (1–10 nm or 10–100 nm or Over 100 nm)

– Chemical composition: (Inorganic substances or Organic substances or Elements of the living kingdom) [7].

Nanoparticles are of great scientific interest, as they are a bridge between bulk substances and their molecular or atomic structure. A bulk substance has constant physical and chemical properties irrespective of its size; nevertheless, at the Nano scale, these properties depend on more or less discreet molecular or atomic phenomena. Regardless of the nature of nanoparticles, their most important physical properties are the following: