New Challenges of the Old Titania Photocatalyst

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The environmentally friendly character of the old TiO_2 photocatalyst is well-known, but even so, it is often in the center of some passionate scientific debates. This is because there are many aspects related to the structural particularities of the titania that are less understood, on the one hand, and newly uncovered aspects related to its multifunctional and/or tunable potential, on the other hand. For instance, the control of its morphology represents an essential parameter that can bring advances in photocatalytic performances. One can include here both the influence of the pore morphology as well as the morphology of the titania crystals.

In this respect, the present work deals in its first part with the challenges brought by the use of the titania aerogel like structure for photocatalytic applications, even alone or in combination with noble metal nanoparticles, in the latter case with the aim of enlarging the multifunctionality of such materials [1]. The second disscussed topic is related to the influence of morphological particularities of anatase titania crystals on the photocatalytic efficiency to decontaminate chemically polluted water. The shape controlled titania microcrystals obtained hydrothermally in the presence of carbon nanotubes, with a high amount of the most reactive {001} facet, were investigated. The created holes and other significant structural and surface alterations observed after samples calcination were found to enhance the photocatalytic activity of titania crystals. The causes that generated the noticed improvements were also analyzed [2]. The third presented issue is dealing with hierarchical TiO_2 nanostructures synthesized by solvothermal method by involving two precursors, namely tetraisopropyl orthotitanate (TTIP) and tetrabutyl orthotitanate (TBU) [3]. It was found that their structural and optical properties are dependent on the synthesis parameters and the developed TiO_2 crystalline systems' crystal phase distribution and the morphology are very sensitive to the solvothermal system composition. The TBU samples exhibited higher conversion rate in photodegradation of a pollutant etalon [3].

Taking into consideration the above-mentioned issues one can infer that the morphological and surface particularities of titania structures are a continuous source of progresses in photocatalysis.

***References*:**

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