Short Communication

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Decomposition of Methylene Blue under Light by Study of Silver Nanoparticles/Titania Composite (Ag-NP/TiO2) thin films using molecular precursor method - Daniel S. Likius- University of Namibia

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Abstract

Pure TiO2 and four Ag-NP/TiO2 composite thin films (COMP-Agn; n = 20, 50, 80 and 100) were fabricated using the Molecular Precursor Method (MPM) at 600 °C. These thin films were then examined as potential photocatalysts by the decolouration reaction of 0.01 mM methylene blue (MB) solution. The thin films were immersed in 10 mL of the MB solution and left under sunlight for 180 minutes under observation, the same procedure was followed, expect it was done under dark, thereafter the UV spectra of all thin films was obtained and examined. UV/Vis spectrometry revealed that the visible light response of TiO2 improved drastically with increasing amounts of Ag-NP doped on TiO2. The UV/Vis absorption spectra also exhibited that TiO2 on its own has no photocatalytic activity in the visible region (400–700 nm) of the electromagnetic spectrum. Furthermore, the intense blue colour of the MB solution was qualitatively examined and was observed to be pale blue or a less intense blue colour after the Ag-NP/TiO2 thin films were removed from the solution. These qualitative and quantitative tests of the decolourization of MB showed that the Ag as the noble metal used, indeed improved the visible light response of TiO2; and therefore Ag-NP/TiO2 composite thin films show enhanced photocatalytic activity compared to pure TiO2.

Introduction:

Numerous photocatalysts have been drawing in a lot of enthusiasm because of their potential applications in the regions of ecological and vitality issues. TiO2 (anatase precious stone structure) was the main semiconductor photocatalyst found in 1972 by Fujishima and Honda. This impetus was just dynamic under bright light for the parting of water on TiO2 cathodes because of its wide band hole (3.0–3.2 eV). To improve the noticeable light affectability (λ > 400 nm) of TiO2 photocatalysts, much work has been done. Most changed and doped photocatalysts have indicated low exercises, poor assimilation of obvious light and generally poor solidness during the photocatalytic procedure. To conquer such confinements, numerous composites, for example, metal oxide/TiO metal oxide/metal oxide, metal/metal halides, chalcogenides and graphene-based composites with heterojunction structure, have been accounted for. Coupling of at least two chalcogenide materials with various band holes has been shown to be a down to earth approach for improving the photocatalytic activity.

Attributable to their intriguing physical and synthetic properties, metal chalcogenides have discovered different potential mechanical applications in vitality transformation, fuel cells, sun oriented cells, sensors, light-radiating diodes, Li-particle batteries, photoelectrochemical water splitting, supercapacitors, thermoelectric and memory devices. Silver and silver-doped mixes have been of enormous enthusiasm in the course of the most recent couple of years because of their high photocatalytic activities. generally, a few photocatalysts have been accounted for, yet just a couple were dynamic under noticeable light as a result of the impetuses' low obvious light usage and the high recombination pace of photograph instigated electron–gap pairs. Several meticulous procedures have been utilized to enhance the light ingestion effectiveness through doping with non-metal anions and change metal cations, surface adjustment with ligands, and honorable metals or polymer underpins.

Biography

Daniel Likius has completed his PhD at the age of 30 years from Kogakuin University, Japan. Currently he is a senior lecturer at the University of Namibia, lecturing Industrial nad Inorhganic chemistry. Currently his research team conisists of 11 master students and 2 PhD students. He has published more than 28 papers in reputed journals and has been serving as a chairperson for research and publication committee in the faculty of Science, University of Namibia.