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## Nanostructured and thin films of bismuth vanadium oxides: Promising materials for photocatalytic applications

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The search for functional materials with efficient photocatalytic (PC) activity is nowadays very active area of research which correlates wide scientific community of physicists, chemists, materials sciences specialists and technologists. Among the well known semiconductor photocatalysts, the titanium dioxide with wide band gap (>3 eV) was exploited in several PC reactions with defined structures (rutile, anatase or mixed polytypes referred as Degussa) and doping agents dedicated to widen the spectral range of absorbed radiation. However, a main drawback to high efficiency of TiO<sub>2</sub> lies in its large band gap and the necessity of the dopants to reduce band gap. The alternative semiconducting oxides based on bismuth vanadium oxides is a promising photocatalytic material due to its band gap ~2.5 eV for the monoclinic phase. Beyond such criterions, nanostructures with high specific surfaces or thin films with rough morphologies can contribute to enhance the PC activity. This is the aim of the work carried out to create original nanostructures and textured thin films with unique monoclinic phase and high specific surfaces. Ball milling and hydrothermal synthesis methods were used to obtain nanoparticles with different shapes (spherical, acicular or rod-like).. In parallel, thin films synthesized by rf-sputtering exhibit well textured surfaces with nanocrystalline islands. Relevant experiments were performed for exhaustive characterizations of the main physical features; i.e., structure, electronic and optical absorption in correlation with the samples morphology and texture. Visible light driven PC reactions were conducted through the degradation of organic dye molecules such as (Rhodamine B and Methylene blue). Comparative efficiencies were analyzed through the characteristic features of the PC reaction kinetics.

### Biography

A Kassiba graduated from Caen University in 1986 in Physics of Matter and Radiation and Habilitation from Maine University in Le Mans (France) for spectroscopic investigations of Incommensurate phase transitions in condensed Matter and EPR spectroscopy. He is a Senior Researcher in the Institute of Le Mans Molecules and Materials (IMMM) affiliated to the French National Centre of Scientific Research CNRS (UMR-6283) and former Director of Physics department 2009-2012. The main research areas are devoted to physics of nanomaterials, nanocomposites for electronics, nonlinear optics and electro-optics, functional mesoscopic materials for optical applications of wide band gap semiconductors such as silicon carbide, titanium dioxide and bismuth vanadates. He is author and co-author of about 100 scientific contributions with major peer review articles and refereed proceedings of conference, co-author of 4 books and attended 28 invited international conferences, gave 30 oral presentations and ensured several Chairman sessions in international conferences (Morocco, Poland, Tunisia, Romania, France, Mexico, China) as well as was the co-organizer of yearly France-Maghreb Nanosciences conferences and Symposium "Advances in functional semiconductors" in IMRC-Mexico. He was also the coordinator of research programs in France and worked with foreign groups from China (Shanghai Institute of Ceramics), Mexico (CINVESTAV), Poland (AJD Czestochowa University).

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