

Editorial

Metal Oxide Nanostructures: Synthesis, Properties, and Applications

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In recent years, nanostructured materials have attracted wide attention due to their fascinating optical and electrical properties, which make these materials potentially suitable for applications in electronics, optics, photonics, and sensors. Some metal oxides show a wide variety of morphologies such as nanowires, nanorods, nanotubes, nanorings, and nanobelts. Synthesis and investigation of these metal-oxide nanostructures are beneficial not only for understanding the fundamental phenomena in low dimensional systems, but also for developing new-generation nanodevices with high performance.

This special issue is focused on synthesis, properties, characterizations, and numerical modeling of metal-oxide nanomaterials and nanostructures with potential applications in photocatalysts, wastewater purification, chemical sensors, and so on.

B. Dai et al. reported that an environment-friendly bio-material bacterial cellulose (BC) was introduced to substitute for general organic polymers to assist the preparation of ZnO/CdS/BC photocatalyst hybrid nanofiber through coprecipitation method under the low-temperature condition. The photocatalytic activities of ZnO/CdS/BC were influenced by the added amount of CdS. It is found that ZnO/CdS/BC nanohybrid fibers (CdS: 10%) show the best photocatalytic efficiency among the samples.

R. Liu and H. Tai Ou reported that IC lead frame scraps were used in their research as raw materials to fabricate

magnetic ferrite powders and combined subsequently with titanium sulfate and urea to produce magnetic photocatalysts by coprecipitation for effective waste utilization. They found that wastes can be transformed to valuable magnetic photocatalysts in their research to solve the separation problem of wastewater and TiO₂ photocatalysts by magnetic field.

M. Mahlambi et al. studied the TiO₂ nanocatalysts supported on a hybrid carbon-covered alumina (CCA) support and carried out a comparison between visible light and UV light degradation of Rhodamine B. The CCA/TiO₂ nanocatalysts had a much larger surface area than the unsupported titania and they exhibited overall higher photodegradation efficiency under both UV and visible light than unsupported TiO₂.

T. Le et al. reported that the enzyme CPO was successfully entrapped inside a silica nanostructure prepared from the precursor TMOS with or without addition of the hydrophobic modifier MTMS. The catalytic performance of optimized CPO sol-gel beads approached 18% relative to free CPO in solution as assessed via the pyrogallol peroxidation assay.

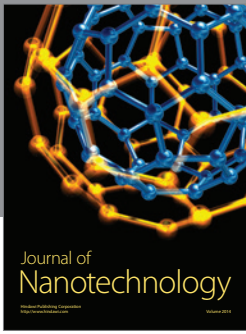
M. Daud et al. carried out a research work for the removal of nitrate from raw water for a drinking water supply using Fe/Pt bimetallic nanoparticles and anion exchange resins. The overall results indicate that Fe/Pt nanoparticles having a large surface area (627 m²/g) are potentially more efficient than the commercially used anionic resins for nitrate removal from water.

Growth mechanisms of nanostructured titania in turbulent reacting flows were studied by S. C. Garrick. Direct numerical simulation is utilized in simulating the hydrolysis of titanium tetrachloride to produce titania in a turbulent, planar jet. Results show that, in the proximal region of the jet, nucleation and condensation are the dominant mechanisms. However, once the jet potential core collapses and turbulent mixing begins, coagulation is the dominant mechanism. The data also shows that the coagulation growth rate is as much as twice the condensation growth rate.

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