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The new 3D Bi_yX_z_TiO_2@$SrTiO_3$ composite structure in photocatalytic degradation process

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Semiconductor-based photocatalysts have attracted increasing interests due to their potential applications in solar energy conversion, hydrogen evolution and photo degradation of organic pollutants. One of the promising approaches is combining some semiconductors to form composites which can improve the efficiency of a photocatalytic system because of novel or enhanced properties that do not exist in individual components. Recently, increasing attention has been paid to the hollow structured materials because of their potential applications for adsorbents, catalysis, drug delivery or even micro reactors. In recent years, bismuth compounds are a promising candidates for visible-light-driven photocatalytic to which increasing attention has been paid. Due to narrow band gap and layered structure, bismuth-containing materials have shown admirable photocatalytic properties under visible light. The characteristics give an opportunity to combine bismuth-containing materials with different semiconductors and create third generation novel composites. The new third generation materials based on Bi_yX_z_TiO_2@$SrTiO_3$ structure (where Bi_yX_z: Bi_2MoO_6, Bi_2WO_6, $BiVO_4$, BiOI) could exhibit higher photocatalytic activity under UV and visible light. Heterogeneous photocatalysis with applying 3D microstructures is really attractive because of low density and (in comparison with other photocatalysts) can be simply separated by filtering without using of centrifugation method. Already described in literature, nanocomposites Bi_yX_z/TiO_2 exhibit enhanced activities in photocatalytic degradation of pollutants under visible light illumination, which can be assigned to the optical absorption ability of Bi_yX_z/TiO_2 nanocomposites in higher wavelength region. The photocatalysts activated by low powered and low cost irradiation sources (such as LEDs or black fluorescent UV lamps) can be used in air and water purification systems.

Biography

M Marchelek is a PhD student and has her expertise in “Nanomaterial synthesis, investigation of photocatalytic activity of semiconductors and characterization of photoactive powders”. Her evaluation of composites structures cerates new possibilities to increase photocatalytic activity of photocatalysts during pollutants degradation processes in gaseous and aqueous phase. The conducted studies on new 3D semiconductor composites in micro scale gives an opportunity to project materials with unique structures and properties, which could be used in photocatalytic treatment system.

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