Synthesis, characterization and photocatalytic performance of visible light induced catalyst for degradation of organic pollutants in aqueous suspension

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A series of Y and V co-doped ZnO (YVZ) nanoparticles have been synthesized by surfactant assisted sol gel method. In addition, visible light driven nanoflower CuS/g-C_3N_4 composites were also synthesized by different wt % CuS using hydrothermal method. The synthesized materials were characterized by standard analytical techniques such as XRD,XPS, SEM-EDX, TEM, UV-visible and FT-IR. Spectroscopy. The XRD analysis clarifies the coexistence of Y and V into ZnO as evidence by the shift of plane towards the lower theta value. The SEM analysis showed an intimate interfacial contact between flower-like CuS and g-C_3N_4 sheet. The photocatalytic formance of the prepared samples were evaluated by studying the degradation of few selected dyes such as Rhodamine B (RhB), Methylene Blue (MB) and 4-nitrophenol (4-NP) under visible light source. Among the series of synthesized YVZ nanoparticle, 3-YVZ (3%Y/1%V-ZnO) was found to be the most active photocatalyst for the degradation of organic pollutants under investigation. The enhanced photocatalytic activity could be attributed to the cooperative effect of Y and V with ZnO. Among various nanoflower composites of CuS/g-C_3N_4, 10 wt% of CuS exhibited highest photoctalytic activity for the decolourization of dyes. This remarkable improved photoctalytic performance could be attributed to the synergistic interaction between CuS and g-C_3N_4. The quenching experiments were conducted to determine the main reactive species formed in the reaction mixture and accordingly a mechanism for enhanced photocatalytic activity has been proposed.