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Unique development of Cu- Ionic treated TiO2 for UV and Visible light active photocatalysts

Abstract:

Copper oxide (CuO) and titanium dioxide (TiO2) can be combined to create a nanocomposite that shows promise for use in photocatalysis, and photoenergy applications. Lately, magnetic oxide particles (MOPs) have attracted interest due to their effectiveness in energy applications; when combined, TiO2 exhibits exceptional performance and distinctive characteristics. TiO2's broad band gap makes it ideal for solar cells, but at higher temperatures, it becomes susceptible to electron-hole pair recombination, which reduces its efficiency. CuO acts as a supporting agent for TiO2, promoting electron transport during photocatalysis, to lessen these disadvantages. In order to create TiO2/CuO decorated particles on an industrial scale and for improved energy applications, this work focuses on modifying the Successive Ionic Layer Adsorption and Reaction (SILAR) technique. This approach is less expensive than Atomic Layer Deposition (ALD). In the 21st century, numerous drugs and techniques have emerged to combat harmful microbial species, with nanotechnology yielding diverse antimicrobial nanomaterials to prevent diseases and toxic effects. This study focuses on synthesizing a nanocomposite, TiO2/CuO, through pseudo-SILAR, wherein CuO is deposited onto TiO2. Characterization techniques including FE-SEM, EDS, and XRD confirm the deposition extent and crystalline nature, while XPS and UV-Visible analysis further elucidate the composite's properties Photocatalytic evaluation demonstrates superior performance of TiO2/CuO, with 90% RhB dye degradation in 120 minutes, outperforming pure TiO2 (10%).

Biography

Saima Kousar is currently pursuing my Master of Science (MS) degree in Material Science and Engineering at Institute of space Technology, Islamabad Under the mentorship of Dr. Abdul Basit Saim, I am is conducting research in the interdisciplinary field of materials science, focusing on the development and characterization of advanced nanomaterials for various applications. My research interests lie in the synthesis, modification, and evaluation of nanocomposites for environmental remediation, energy harvesting, and biomedical applications. With a passion for exploring innovative solutions to complex engineering challenges, I actively contributes to cutting-edge research initiatives aimed at addressing pressing global issues. My dedication to academic excellence and my commitment to advancing the field of materials science make a promising young researcher poised to make significant contributions to the scientific community.