

Synthesis of oxynitride doped TiO_2 and its visible activity after BLED reaction or UV preillumination

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Oxynitride doped TiO_2 (TiON) was synthesized by wet process to explore the possibility of visible light utilization for water splitting and environmental remediation including IAQ control. After completing hydrolysis of TiCl_4 , NH_3 aqueous solution was added. This mixed solution was aged via an isothermal heat exchanger, and then filtration process was employed to remove chloride ions in solution. Two different TiON powders were also collected by drying process and heat treatment of colloidal solution at room temperature (RT) and 400°C in air for 1 hour (HT), respectively. TEM analysis showed less than 10nm size of TiON particles, and about $320\text{m}^2/\text{g}$ of BET surface area with 20–30Å of mesopore diameter was measured. The XRD spectra indicated oxynitride-doping of anatase to produce pale yellowish powder. The red shift of absorption to 520–550nm was observed by UV-VIS DRS spectrum measurement. By XPS analysis after Argon sputtering, it was observed that oxynitride was doped in TiO_2 . The visible light photocatalytic activities of HT TiON powder with gaseous TCE and toluene, and water splitting were investigated upon different illumination modes and light sources.