

Heterogeneous photocatalysis for environmental and energy application

김우열†

숙명여자대학교

(wkim@sookmyung.ac.kr†)

TiO₂ as a photocatalyst is a widely investigated for very diverse applications because it is eco-friendly and inexpensive. Although intensive research has been reported, the complete understanding of photocatalytic phenomenon and mechanisms of mobile hydroxyl radical generation is still far away. In this study, selective generation of mobile hydroxyl radicals on anatase of TiO₂ was confirmed using tetramethylammonium (TMA) in acidic condition, but its decomposition was negligible on the rutile phase. The pH-dependent electrostatic interactions cause the surface trapped holes to participate in the oxidation of TMA by adsorbing TMA to anatase and rutile in base condition by changing the decomposition behavior of TMA. Thus, the trend selectively distinguishes a surface trapping holes and a mobile hydroxy radical derived from photocatalysis. The direct evidence gathered from various spectroscopic and photocatalytic TMA decomposition results will help to reveal the controversial mechanism mediating hydroxyl radicals, raised in diverse advanced oxidation processes.