

Photocatalytic Reactivities of Nafion-Coated TiO_2 for UV or Visible Light-Induced Degradation of Charged Organic Compounds

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Nafion on TiO_2 particle (Nf/ TiO_2) uniquely affects photocatalytic mechanisms and kinetics for photodegradation of charged organic compounds under UV or visible light irradiation. By adding nafion to naked TiO_2 suspension, zeta potentials of TiO_2 particle are greatly shifted to negative values with entire pH range, and the negative shift is larger with nafion concentration. Under UV illumination, effects of nafion on photocatalytic reactivity are very different depending on the ionic character of substrates to be degraded, and the photocatalytic reactivity is highly governed by electrostatic interaction. On the other hand, nafion coating markedly enhances the photocatalytic reactivity in visible light-induced degradation of charged dyes (anionic AO7, cationic methylene blue (MB), zwitterionic rhodamine-B (Rh-B)). In addition, nafion changes the photocatalytic degradation pathway of cationic Rh-B from chromophore cleavage to N-deethylation. The enhanced photodegradation of dyes are closely related to electron transfer of dyes to TiO_2 conduction band, which is discussed by comparison of photocurrents. The detailed mechanism will be presented.