Synergic Production of Hydrogen and Degradation of Organics Using TiO2 Modified with Dual Surface Components

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TiO_2 photocatalysis has been widely applied for both pollutant degradation and hydrogen production. However, most works on TiO_2 photocatalysis have focused only on either of two applications because one photocatalytic process works in a condition that is very different from the other. Generally, the photocatalytic degradation of organic compounds does not occur in the absence of O_2 whereas the photocatalytic production of hydrogen does not proceed in the presence of O_2. To achieve dual-function photocatalysis (i.e., simultaneous production of hydrogen and degradation of pollutants), water (or protons) instead of dioxygen should be used as an electron acceptor selectively. To attain this goal, the charge transfer/recombination processes occurring on TiO_2 can be controlled by modifying the surface properties. In this study, we successfully achieved the simultaneous production of hydrogen and degradation of organic pollutants (4-chlorophenol, urea, and urine) using titania photocatalysts which were modified with both anion adsorbates (fluoride or phosphate) and (noble) metals. The activities of dual-function photocatalysts were investigated as a function of various experimental parameters to understand their unique photocatalytic behaviors.

References

1. J. Kim, D. Monllor-Satoca, W. Choi: *Energy Environ. Sci.* 5 (2012) 7647.
2. J. Kim, W. Choi: *Energy Environ. Sci.* 3 (2010) 1042.