

Catalytic and photocatalytic chemistry for purification of groundwater polluted with nitrate

Sustainable supply of clean fresh water is an important condition for sustainable development in the future. Groundwater provides clean and stable fresh water, and thus its effective utilization is a key for the sustainable supply of water. However, pollution of groundwater with nitrate (NO_3^-) have been found throughout the world. Reduction of NO_3^- with H_2 to form N_2 over a solid catalyst has attracted much attention as a technology for purification of the polluted groundwater. So far, some catalysts and catalytic reaction systems with acceptable activity and selectivity have been found. However, most studies thus far including some of ours have dealt with pure NO_3^- water (aqueous NO_3^- solution) for development of the catalysts, though it is expected that cations, anions, and water-soluble organic matters in groundwater have negative effect on the catalytic performance. In my lecture, our efforts to address the purification of real groundwater by the catalytic hydrogenation will be presented. In addition, photocatalytic reduction of NO_3^- by a tandem reaction system consisting of Pt/ TiO_2 photocatalyst and a bimetallic catalyst will be shown as a promising photocatalytic system for the groundwater treatment.