TiO$_2$ photocatalysis has been extensively studied for its environmental applications and demonstrated to be a technically viable clean-up process.\(^1\) The main drawbacks of the low quantum yields and the lack of visible-light utilization, however, hinder its widespread acceptance as a practical remediation technology. Various approaches have been attempted to enhance the photocatalytic efficiency of TiO$_2$, which include metal-ion doping, metallization, and sensitization. In this study, we investigated and compared the effects of depositing nano-sized metal particles (M: Pt, Au) on TiO$_2$ in four different photocatalytic systems: (1) dye-sensitized M/TiO$_2$ for the visible light photocatalytic degradation of perchlorinated compounds, (2) M/TiO$_2$ photocatalyst for ammonia removal, (3) M/TiO$_2$ photocatalyst for trichloroacetate (TCA) degradation, and (4) M/TiO$_2$ photocatalyst for CO oxidation. The Pt and Au particles were photodeposited on TiO$_2$ (Degussa P25) with a typical loading of ca. 0.2 wt%. The transmission electron microscopic (TEM) images showed that Pt particles with a size range of 1-2 nm were well dispersed on TiO$_2$ particles (20-30 nm diameter). The photocatalytic activity and mechanism of Pt/TiO$_2$ was significantly different from those of pure TiO$_2$. Although the platinization of TiO$_2$ has been widely studied, its effect on the photocatalytic mechanism is not well understood. The role of metals and their effect on the photocatalytic reaction system will be discussed.

[참고문헌]