金・銀ナノ粒子を含有する可視光応答光触媒の合成とその物性

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Synthesis of visible-light-sensitive photocatalyst of titanium dioxide embedded gold and silver nanoparticles and its properties ([1]*Environmental and Materials Chemistry Course, Osaka Prefecture University College of Technology*, [2]*Department of Materials Science, School of Engineering, The University of Shiga Prefecture*) ○Suguru Higashida,[1] Shotaro Yoshida,[1] Kiseki Yamamoto,[1] Tsuyoshi Akiyama,[2]

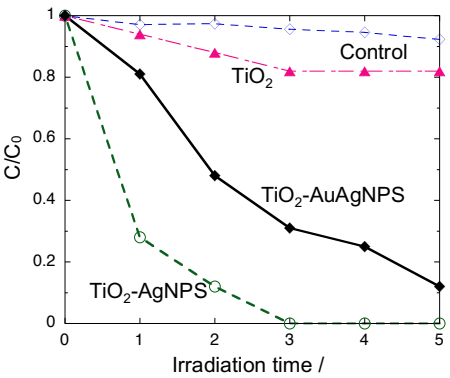
In recent years, metal nanoparticles-containing titanium dioxide photocatalysts using localized surface plasmons have been widely studied. We have succeeded in simple one-pot synthesis of visible-light-responsive titanium dioxide photocatalyst with embedded silver nanoparticles, and succeeded in efficient visible light decomposition of methylene blue (MB) under 530 nm LED irradiation.

In this time, titanium isopropoxide and gold / silver ions were mixed under ultraviolet light irradiation to synthesize a visible-light-responsive photocatalyst in which gold / silver nanoparticles were embedded, and then the calcined temperature was changed. A photocatalyst obtained by calcining gold / silver nanoparticles at 400 °C was synthesized, and decomposition of MB was observed.

Keywords: photocatalyst; Gold; Silver; Nanoparticle; Visible-light

近年、局在表面プラズモンを利用した金属ナノ粒子含有二酸化チタン光触媒が広く研究されている。これまで我々は銀ナノ粒子を二酸化チタン内に埋め込んだ可視光応答光触媒を簡便なワンポット合成に成功し、530 nm の LED 照射下、メチレンブルー(MB) の効率的な可視光分解に成功した[1)]。

今回、チタンイソプロポキシドと金・銀イオンを紫外光照射下で混合し、金・銀ナノ粒子を埋め込んだ可視光応答光触媒を合成し、その後、焼成温度の変化を行った。金・銀ナノ粒子を 400 ℃で焼成した光触媒が合成でき、MB の分解が観測された。



The MB decomposition rate profiles obtained using TiO_2-AuAgNPS, TiO_2-AgNPS and TiO_2, and corresponding control under 530 nm light irradiation.

1) One-pot synthesis of visible-light-responsive titanium oxide photocatalyst with embedded silver nanoparticles has been reported. S. Higashida, S. Yoshida, N. Koyama, K. Suzuki, T. Oku, T. Akiyama, *Journal of Sol-Gel Science and Technology*, **2021**, 98, 281

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