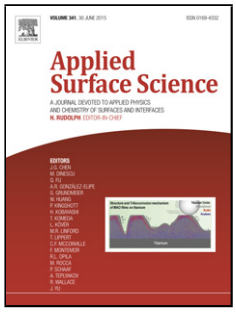

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Photocatalysis oxidation activity regulation of Ag/TiO_2 composites evaluated by the selective oxidation of Rhodamine B

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Highlights

1. The photooxidation activity of Ag/TiO_2 can be adjusted by visible and ultraviolet.

2. Rhodamine B can be selective oxidized by Ag/TiO_2 only under visible light.

3. The role change of Ag in Ag/TiO_2 can adjust the effect of different radicals.

4. Improving the effect of superoxide anion radicals is help to form Rhodamine 110.

5. The as-prepared Ag/TiO_2 has ultrahigh specific surface areas of about 400 $m^2\ g^{-1}$.

Abstract: With the aid of TiO_2 and Ag/TiO_2 composites with ultrahigh specific surface areas (about 400 $m^2\ g^{-1}$), we demonstrated a facile controlled strategy to adjust the photooxidation activity of Ag/TiO_2 in the photocatalysis degradation process of Rhodamine B (RhB). A series of photocatalysis experiment results indicated that the selective oxidation of RhB could be performed through changing irradiation light. When the as-prepared unannealed Ag/TiO_2 was used as photocatalyst, Rh-110 was produced only under visible light irradiation. Instead, RhB would be oxidized completely under ultraviolet irradiation or using the annealing Ag/TiO_2. Although there were many photocatalysis degradation mechanisms of RhB in previous literatures, we have not found an appropriate mechanism to explain this phenomenon. Radical-trapping tests indicated that the effect of superoxide anion radical was more important than hydroxyl radical in the forming process of Rh-110, and hence the selective oxidation mechanism of Ag/TiO_2 was suggested according to the role changing of Ag nanoparticles on the composites under visible and ultraviolet irradiation.