36－57　Surface treatment of silicon carbide using TiO_2 photocatalyst

大学院自然科学研究科　後期課程　石川善恵
教　授　松本泰道
前期課程　西田葉子
谷口慎一
知能生産システム工学科　教　授　渡邉純二

Silicon carbide (SiC) and diamond were decomposed to CO_2(g) by the photocatalysis with TiO_2 at room temperature, although the decomposition rate of diamond was very slow. According to the XPS spectra of Si2p on the SiC surface, SiO_2 was simultaneously formed on the surface by the TiO_2 photocatalysis. The thickness of the SiO_2 formed on the SiC surface during the photocatalytic oxidation for 1 h was estimated to be about 40 A from the depth profile of the XPS spectra using Ar etching. The SiC surface was oxidized by the TiO_2 photocatalysis even under the condition without a direct contact with the TiO_2. This indicates that the photocatalytic oxidation of the SiC occurs due to active oxygen species photogenerated on the TiO_2 surface, but not by hole produced in the valence band of the TiO_2. Moreover, a remote surface treatment system using the quartz beads coated with TiO_2 was developed for the SiC surface oxidation. Consequently, the TiO_2 photocatalysis will be very useful for the surface treatment of SiC such as photopatterning without defects and damage to the substrate because the photocatalytic reaction is carried out under mild conditions.

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