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Photocatalytic Decomposition of Alkylsiloxane Self-Assembled Monolayers on TiO_2 Thin Films

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The photocatalytic decomposition of octadecyltrichlorosilane(OTS) based self-assembled monolayer formed on TiO_2 has been studied using atomic force microscopy(AFM), x-ray photoelectron spectroscopy(XPS) and contact angle analysis.

The TiO_2 thin films were grown on Si(100) substrates by atomic layer deposition from titanium isopropoxide and water. Densely-packed alkylsiloxane monolayers similar in quality to those on oxidized Si(100) are formed on TiO_2. The monolayers begin to decompose through C-C bond cleavage, resulting in the desorption of hydrocarbon fragments under UV illumination in air. The siloxane head groups remain in the TiO_2 surface following the decomposition of the monolayers.