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Atomic Layer Deposition of TiO₂ Thin Films from Titanium Isopropoxide and Water

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The TiO₂ thin films were grown by atomic layer deposition(ALD) from titanium isopropoxide(Ti(OCH(CH₃)₂)₄) and water(H₂O). In order to make high-quality TiO₂ thin films with controlled thickness at the atomic level, it is necessary to deposit each atomic layer completely at a time with 100 % step coverage on the substrate. In this research, the growth behavior of the TiO₂ thin films has been studied to develop the ALD which comprise the complete surface reactions.

The structure, chemical composition, morphology, thickness of the deposited films were investigated by ultraviolet(UV) spectrometry, atomic force microscopy(AFM), x-ray diffraction (XRD), x-ray photoelectron spectroscopy(XPS), and secondary electron microscopy(SEM). The results show that the growth behavior of the TiO₂ thin films is affected by catalysts and chemical properties of substrate surface as well as the ALD conditions. To develop the ALD of the TiO₂ thin films with the complete surface reaction, the modification of the substrate surfaces by the self-assembled monolayers, and the catalytic activation of the surface reactions have been studied.