Photocatalytic characterization of the TiO_2 fabricated by atomic layer deposition using TDEAT and H_2O_2

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A reaction system of tetrakis-diethyl-amido-titanium(TDMAT) and H_2O_2 was evaluated as a possible process to prepare TiO_2 thin films using Atomic Layer Deposition(ALD) process. Avantage of this process was that films were deposited at low temperature. Titanium dioxide thin films were grown by Atomic layer deposition(ALD) at 100-300℃ using tetrakis-diethyl-amido-titanium (TDEAT) that is similar structure with TDMAT, and H_2O_2 as a precursor and reactant, respectively. The effects of deposition temperature, reactant pulse and purge times on the film growth rate were investigated to optimize the ALD process of TiO_2. Anatase TiO_2 was prepared by annealing in the Air condition. All samples were tested a photocatalytic activity in methylene blue aq. Concentration of Methylene blue was evaluated by UV-visible spectrophotometer. TiO_2 film properties such as step coverage, composition, and crystallinity were evaluated by using scanning electron microscopy (SEM), Auger electron spectroscopy (AES), X-ray photoemission spectroscopy (XPS) and X-ray diffractometer (XRD).