

Preparation of titanium dioxide thin films by indirect-electrodeposition

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Titanium oxide films were prepared on a quartz glass substrate by the cathodic galvanostatic electrolysis of a solution of titanium bis(ammonium lactato)dihydroxide and ammonium nitrate at 323 K using a stainless steel electrode as a “dummy electrode” located in the vicinity (within ~1 mm) of the substrate. This novel film preparation method, named “indirect electrodeposition” is effective for nonconductive substrates without catalysts or reducing agents. During indirect electrodeposition, the films are deposited on the area of the substrate above the electrolyte solution surface. The deposited film was identified as TiO_2 by X-ray photoelectron spectroscopy. The amorphous as-deposited film was converted to the anatase-type crystalline TiO_2 phase by calcination at 723 K. Optical bandgap of the film was evaluated with Kubelka-Munk function from diffuse reflection spectra.

