Growthof Titanium Suboxide Thin Films by Reactive DC Magnetron Sputtering

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Titaniumsuboxides have a various physical and chemical properties with a reactivenature, which is mainly controlled by crystallinity and stoichiometry. Ascompared to well-known titanium dioxides, the titanium suboxides can have abroad range of the optical band gap, work function and electrical conductivity.However, the suboxides are in metastable states so that the growth window isvery narrow and particular unequilibrium growth condition is required. Bycarefully adjusting the plasma ignition parameters in a reactive DC sputteringtechnique, we have successfully grown the titanium suboxides with a differentoxygen content. In-situ plasma optical emission spectroscopy was utilized tomonitor the plasma states. Depending on each growth condition, we then investigated the crystal structural properties of the thinfilms by x-ray diffraction and Raman spectroscopic methods. The electricalproperties were also studied by current-voltage measurements. Furthermore, theoptical properties and energy band gap of the thin film were examined by usingan UV / visible spectroscopic method.

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