

Deposition of TiO₂ thin films using grid-assisting magnetron sputtering

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It is well known that thin film growth and surface morphology can be substantially modified by ion-bombardment during the deposition. This is particularly important in case of thin-film deposition at low temperatures where the film growth occurs under highly nonequilibrium conditions. An attractive way to promote crystalline growth and surface morphology is deposition of additional energy in to the surface of the growing film by bombardment with hyperthermal particles.

We were deposited crystalline Ti and TiO₂ thin films on Si substrate by magnetron sputtering method with grid. Its thin films were highly smoothed and dense as increasing grid bias.

In order explore the benefits of a bombardment of the growing film with high energetic particles, Ti and TiO₂ films were deposited on Si substrates by an unbalanced magnetron sputter source with attached grid assembly for energetic ion extraction. Also, we have studied the variation of the plasma states for the feed back control of nucleation and growth behavior by Langmuir probe and Optical Emission Spectroscopy (OES). The epitaxial orientation, microstructural, optical characteristics and surface properties of the films were analyzed by XRD, SEM, Elipsometry and AFM.