Role of Energetic Species in the Growth of Porous TiO_2 Thin Films by Physical Vapor Deposition

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In this presentation we show the main morphological features of TiO2 thin films deposited by two different physical vapor deposition techniques at oblique angles: magnetron sputtering [1] and electron beam-assisted physical vapor deposition. Although both techniques share common features, in the former, films are grown by the incorporation of both, thermalized species with an isotropic momentum distribution and ballistic high kinetic energy species with a narrow momentum distribution, and under the impingement of plasma ions [2]. In the latter, however, the vapor species arrive at the film surface with low kinetic energy and with a narrow momentum distribution function in absence of plasma [3]. Experimental analyses on the films' densities and morphologies are carried out and discussed under the light of the results of a Monte Carlo growth model. In general, columnar structures with different tilt angle, density and porosity are found depending on the energy and momentum distribution of the deposition species [4].

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