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**MICROSTRUCTURE OF MIXED OXIDE THIN FILMS  
PREPARED BY MAGNETRON SPUTTERING AT OBLIQUE  
ANGLES**

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**Abstract**

Several mixed oxide thin film series of samples (Si-Co-O, Si-Ni-O, Si-W-O) have been prepared by reactive magnetron sputtering at oblique angle geometries. The paper focuses on the description of microstructure of the films as a function of their stoichiometry. It is found that for identical process parameters (gas mixture, pressure, magnetron-substrate distance, incidence angle of the vapour flux, etc) the tilt angle of the developed columnar microstructure and the film porosity is strongly dependent on the stoichiometry of the films. The results are discussed in the framework of several theoretical models on this topic.

**Keywords:** oblique angle deposition, glancing angle deposition, reactive magnetron sputtering, mixed oxides, porous thin films, electrochromic films

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