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yttrium oxide

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Yttrium oxide thin films are deposited using indigenously developed metal organic precursor (2,2,6,6-tetra methyl-3,5-hepitane dionate) yttrium, commonly known as Y(thd)3 (synthesized by ultrasound method). Microwave electron cyclotron resonance plasma assisted metal organic chemical vapor deposition process was used for these depositions. Depositions were carried out at a substrate temperature of 350 ℃ with argon to oxygen gas flow rates fixed to 1 sccm and 10 sccm respectively throughout the experiments. The precursor evaporation temperature (precursor temperature) was varied over a range of 170–275 ℃ keeping all other parameters constant. The deposited coatings are characterized by X-ray photoelectron spectroscopy, glancing angle X-ray diffraction and infrared spectroscopy. Thickness and refractive index of the coatings are measured by the spectroscopic ellipsometry. Hardness and elastic modulus of the films are measured by load depth sensing nanoindentation technique.
C-Y2O3 phase is deposited at lower precursor temperature (170 ℃). At higher temperature (220 ℃) cubic yttrium oxide is deposited with yttrium hydroxide carbonate as a minor phase. When the temperature of the precursor increased (275 ℃) further, hexagonal Y2O3 with some multiphase structure including body centered cubic yttria and yttrium silicate is observed in the deposited film. The properties of the films drastically change with these
structural transitions. These changes in the film properties are correlated here with the precursor evaporation characteristics obtained at low pressures

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