

Title: Structural and dielectric properties of boron-doped and un-doped mullite thin films

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Abstract: A sol–gel technique being simple, low cost and application oriented has been used to synthesize doped and un-doped mullite sols. These films have been spin-coated onto copper substrates. Effect of boron doping on the transformation kinetics of mullite was studied by preparing two sols with ratio Al/Si/B = 3/1/0 and Al/Si/B = 3/1/0.5. Surface morphology of thermally stable films showed uniformity in doped and un-doped samples. X-ray diffractometer results revealed orthorhombic mullite formation from both sols at a temperature of 500 °C for un-doped and at 350 °C for doped mullite films. Small crystallite size ~11 nm and low dielectric value ~5.84 (at 3 MHz) were observed in boron-doped films. Un-doped mullite films also showed relatively low dielectric constant, ~6.36, as compared to the previously reported values. The stoichiometry of films was confirmed by EDX and spark source mass spectrometry.