Electrical properties of MIM capacitor with La_2O_3 dielectrics deposited by ALD

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La_2O_3 thin films were grown on the TiN substrates at 300℃ by atomic layer deposition (ALD) technique using lanthanum 2,2,6,6-tetramethyl- 3,5-heptanedione [La(TMHD)$_3$] and H_2O as precursors. The structural and the electrical properties of the grown films were investigated by AFM, TEM, XPS, XRD, I-V, and C-V measurements. When the as-grown La_2O_3 thin films were annealed at various temperatures in N_2 ambient, the electrical properties were dramatically improved. In the metal-insulator-metal (MIM) capacitors with La_2O_3 thin films post-annealed at 500℃, the dielectric constant was 17.3 and the leakage current densities were 2.78×10^{-10} and 2.1×10^{-8} A/cm^2 at +1 V and −1 V, respectively.