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Surface chemistry studies of the ALD process of ZrO_2 thin films

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The growth mechanisms of the ZrO_2 thin films in the UHV-ALD process have been studied using XPS and LEED. ZrO_2 thin films were synthesized on oxidized Si(111), using $ZrCl_4$ and H_2O as precursors. A series of repetitions of -Cl and -OH exchange reactions result in a layer-by-layer growth of ZrO_2 thin films. ZrO_2 thin films were also synthesized, using $Zr[OC(CH_3)_3]_4$ and H_2O as precursors. A series of repetitions of $-OC(CH_3)_3$ and -OH exchange reactions produce ZrO_2 thin films. The chemical species on the surface at each deposition step were successfully identified.