

Abstract Submitted
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A Novel Template Approach by MBE for ALD Growth of High k Dielectrics K.Y. LEE, Dept. of Mat. Sci. and Eng., National Tsing Hua Univ., Taiwan, , W.C. LEE, M.L. HUNG, Y.C. LEE, C.H. CHANG, Y.K. CHIOU, M. HONG, J. KWO, Dept. of Phys., National Tsing Hua Univ., Taiwan. — Although growth of high k dielectrics by ALD on H-Si is feasible, it undergoes an incubation period during which the formation of SiO₂ layer seems inevitable. Recently we showed the MBE growth of HfO₂ on Si produced atomically abrupt interfaces, and achieved excellent electrical performance. Here we employed the MBE-grown high k dielectrics thin film as a template to suppress the interfacial layer formation during the ALD growth, and to improve the electrical properties of ALD films. The first demonstration is a bi-layer composite made of a lower HfO₂ (MBE) layer 2.5nm thick, and an upper Al₂O₃ (ALD) film 4.0nm thick. The electrical properties are consistent with the two capacitors in series from two individual dielectric layers. The second demonstration is an MBE and ALD composite Al₂O₃ 6.6nm thick. Studies are underway for the third structure of Al₂O₃ (MBE) and HfO₂ (ALD) composite, which offers dual advantages of interfacial layer suppression and leakage current reduction during HfO₂ recrystallization.

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