TF-005

Study of SrTiO₃ for Dielectric Thin Films Grown by Plasma-Enhanced Atomic Layer Deposition

임찬중¹, 임동혁², 마진원², 조만호², 권학용³, 박형상³, 유용민³, 고대홍¹

¹연세대학교 세라믹공학과, ²연세대학교 물리 및 응용물리학과, ³ASM Genetech Korea(주)

SrTiO₃ (STO) thin films as the capacitor dielectrics for the dynamic random access memory (DRAM) were deposited by plasma-enhanced atomic layer deposition (PE-ALD) method with alternating supply of reactant source, Ti(O-i-C₃H₇)₄ (TTIP) and Sr(BuCp)₂ as Ti and Sr precursors respectively. Oxygen plasma as an oxidant under different conditions. To optimize of STO films deposition, we controlled the ALD process conditions of TiO₂ films and SrO films such as substrate temperature, source dosing time, RF plasma generating power, RF plasma generating time and reactant O₂ gas flow rate. Chemical bonding state and structural properties of as-grown STO films was investigated by x-ray photoelectron spectroscopy (XPS) and X-ray diffraction (XRD). It is found that Ti anatase phase in the TiO₂ films appear at the substrate temperature above 250°C and 500 cycles, STO phase in the grown films appear at the post annealing temperature above 700°C. The electrical properties of Pt/TiO₂/TiN/Si and Pt/STO/TiN/Si structured films were also investigated by I-V, C-V measurements.

TF-006

Electric Field Control of Spin–Orbit Interaction in Modulation-doped InAs Quantum Well Structure.

Kyung Ho Kim, Hyung Jun Kim*, Hyun Cheol Koo, and Suk Hee Han

Center for Spintronics Research, KIST

The main concept of spin field effect transistor (spin-FET) is that the control of spin-orbit interaction (SOI) in a semiconductor channel manipulates spin precession. The SOI in the asymmetric potential well of the channel can be controlled by a gate electric field. Here we have carefully investigated SOI parameter (α) modulation by gate electric field (Vg) in the double-sided doped InAs channel structure (Fig. 1. left). By analysing beating patterns obtained form Shubnikov-de-Hass oscillation, we determine that α is non-linearly decreased as the increase of Vg (Fig. 1. right). From the figure, α was significantly changed at the negative Vg region, but almost saturated at the positive Vg region, indicating that the control of spin precession is insensitive in the positive Vg region. In this presentation, we will discuss evidence of the non-leaner behavior on the analogy of potential well for the structure.

* Correspondence E-mail : mbeqd@kist.re.kr

Fig. 1 A Cross-sectional view of double-sided doped InAs QW structure (left), and calculated spin-orbit interaction parameter as the external gate electric field for the structure (right).