TF-005

Study of $SrTiO_3$ for Dielectric Thin Films Grown by Plasma-Enhanced Atomic Layer Deposition

임찬중[1], 임동혁[2], 마진원[2], 조만호*[2], 권학용[3], 박형상[3], 유용민[3], 고대홍[1]

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

$SrTiO_3$ (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, $Ti(O\text{-}i\text{-}C_3H_7)_4$ (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 TiO_2 films and SrO films such as substrate temperature, source dosing time, RF plasma generating power, RF plasma generating time and reactant O_2 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 TiO_2 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/TiO_2/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 controled 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 V_g (Fig. 1. right). From the figure, α was significantly changed at the negative V_g region, but almost saturated at the positive V_g region, indicating that the control of spin precession is insensitive in the positive V_g region. In this presentation, we will discuss evidence of the non-leaner behavior on the analogy of potential well for the structure.

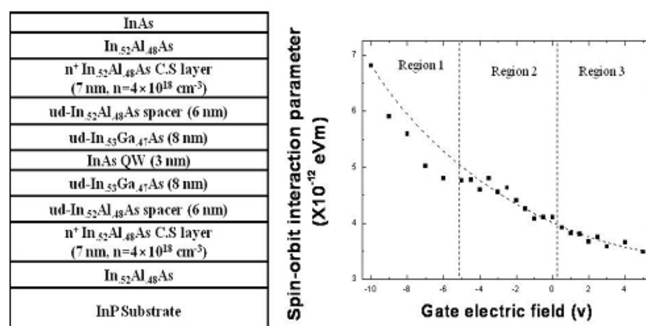

Fig. 1 A Cross-sectional view of double-sided doped InAs QW structure (left), and calculated spin-orbit interaction parameter as the external gate electric field for the structure (right).

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