The successful gate control of InSb two-dimensional systems is essential for extending our RD-NMR studies to the wider-range pump-and-probe experiments. They are also important to spintronics application of InSb systems including Majorana physics. To achieve this goal, high-quality Al\textsubscript{2}O\textsubscript{3} dielectrics were grown by atomic layer deposition (ALD) on InSb quantum wells. Magnetotransport measurements were carried out to clarify the characteristics of a gated InSb quantum wells. When we deposited Al\textsubscript{2}O\textsubscript{3} dielectrics on InSb top layer, the density of two-dimensional electrons in the QW was tuned by \( V_g \) but saturated at more negative \( V_g \), probably due to hole accumulation at the interface. The better controllability without parallel conduction appears when we deposited Al\textsubscript{2}O\textsubscript{3} dielectrics directly on InAlSb top layer. The wider bandgap of Al\textsubscript{0.1}In\textsubscript{0.9}Sb top layer resulted in a linear, sharp, and non-hysteretic response of the 2DEG density to the gate bias as shown in Fig. 1. The obtained gate sensitivity reached to \( \frac{dn_s}{dV_g} = 3.9 \times 10^{15} \text{ m}^{-2} \text{V}^{-1} \).

![Fig. 1](image)

Representative publications: