2 dimensional electron gas in chemically stable SrSnO$_3$/KTaO$_3$ interface

HYUKWOO KWON, CHULKWON PARK, KOOKRIN CHAR, Department of physics and astronomy, Seoul National University, MATERIALS & DEVICES PHYSICS LAB. TEAM — Recent 2DEGs are mostly formed at the interface of LaAlO$_3$/SrTiO$_3$(LAO/STO) system, which is explained by the polar catastrophe mechanism. Because of large propensity of oxygen vacancy formation in SrTiO$_3$, there remains a possibility that the origin of 2DEG of LAO/STO system may stem from extra charge of oxygen vacancy of SrTiO$_3$, not from the polar layer of LaAlO$_3$. In this presentation, we report the realization of 2DEG at the interface of SrSnO$_3$/KTaO$_3$(SSO/KTO), which is chemically stable due to extremely stable oxygen stoichiometry. This SrSnO$_3$/KTaO$_3$ heterostructure was epitaxially grown by pulsed laser deposition and the interface was found atomically matched by transmission electron microscope and reciprocal space mapping. We measured the magnetic property of SSO/KTO heterostructure and acquired a large ferromagnetic signal, which is unchanged in the temperature range of 4~300 K by SQUID magnetometer measurement. As SrSnO$_3$ and KTaO$_3$ are non-magnetic materials, this ferromagnetic signal may result from 2DEG at the interface of SSO/KTO. We hope our results can shed lights on the exact mechanism of 2DEGs that are formed at oxide interfaces.