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Electric field control of spin precession in $KTaO_3$ field-effect transistor HIROYUKI NAKAMURA, Osaka University, TSUYOSHI KIMURA, Osaka Univ — Field-effect transistors (FET) with $KTaO_3$ single crystal channel were fabricated to study spin-orbit coupling effects on the gate-induced electron gas. By applying gate voltage via organic gate insulator parylene, an electron accumulation layer was successfully formed at the interface of $KTaO_3$. By analyzing magnetoresistance associated with weak ntilocalization at low temperature, we find that the spin precession length is remarkably short in this system, in the 20-70 nm range [1]. The factors possibly leading to this remarkably short spin precession length are 1) heavy electron mass originating from d-bands, 2) strongly asymmetric potential well, and 3) strong spin-orbit coupling caused by $5d$ element, tantalum.

[1] H. Nakamura and T. Kimura, Phys. Rev. B, 80, 121308(R) (2009).

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