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Gate Controlled Current Oscillation observed in a Fe/In(Ga)As Field-Effect Spin Transistor Structure KANJI YOH, Hokkaido University, MARHOUN FERHAT, CREST-JST, ALEXANDRU RIPOSAN, University of Michigan, JOANNA MILLUNCHICK, University of Michigan, HOKKAIDO UNIVERSITY COLLABORATION, UNIVERSITY OF MICHIGAN COLLABORATION — We report anomalous transport behavior in strained InGaAs heterojunction spin transistor structure embedded with ferromagnetic electrodes (Fe) as spin injector/detector. The meta-stable InGaAs channel layer contains 81% of indium, which enables increased spin-orbit interaction as well as ideal non-alloyed Ohmic contact with Fe spin injector/detector[1][2]. We have observed clear current oscillations when the electrodes were magnetized along the channel current at room temperature. The drain current oscillation dependence on gate voltage agreed with the estimation of spin precession and spin relaxation in the channel based on Monte Carlo simulation. We believe that this is the first observation of spin transistor operation. Our structure design made it possible to tune the Rashba and Dresselhaus effect [3] enabling long lived spin polarization in the 2DEG channel. References [1] H.Ohno, Kanji Yoh et al, Jpn.J.Appl.Phys. Express Lett. Vol.42 pp.L1-L3 (2003) [2] Kanji Yoh, Hiroshi Ohno, et al, "Spin polarization in photo- and electroluminescence of InAs and metal/InAs hybrid structures", Semi.Sci.Technol. 19, 1-4 (2004) [3] Schlieman et al, Phys.Rev.Lett.90, 146801 (2003)

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