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# Electrical detection of spin transport in a ferromagnet-semiconductor hybrid system

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Spin-FET(Spin Field Effect Transistor) has an major interest in the field of spin electronic devices because of its high speed and low power consumption. In this work two-dimensional electron gas structure with InAs channel is used for spin transport channel and NiFe is used for spin injector and detector. In conventional non-local method, spin accumulations are clearly sensed at ferromagnet electrode at 1.8K - 300K. Rectangle-like resistance change is also detected in the conventional spin-valve geometry without substantial noise. Inverted HEMT (High electron mobility transistor) structure where the carrier supplier is located below the active layer is utilized in this work. The reason is that injected spin polarized electron would avoid scattering with a large number of carriers or defects crossing the carrier supply layer. Spin controllability is proved using detection of Rashba effect inside spin transport channel. The spin splitting induced by spin orbit coupling i.e. Rashba effect is observed using Shubnikov de Hass Oscillation[1]. Rashba constant, which governs the degree of spin precession in the channel, can be modulated by gate electric field. Observation of spin transport and Rashba effect in the same system means that there is high possibility for realizing spin-FET

1. J. Nitta, T. Akazaki and H. Takayanagi, Phys. Rev. Lett. **78**, 1335 (1997).