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Spin Transport Properties in Nondegenerate Si at Room Temperature TAKAYUKI TAHARA, Kyoto University, HAYATO KOIKE, TDK Corporation and Osaka University, TOMOYUKI SASAKI, TDK Corporation, YUICHIRO ANDO, Kyoto University, MAKOTO KAMENO, YOSHISHIGE SUZUKI, Osaka University, MASASHI SHIRAISHI, Kyoto University, KYOTO UNIVERSITY TEAM, TDK CORPORATION COLLABORATION, OSAKA UNIVERSITY COLLABORATION — So-called beyond-CMOS technologies have been intensively investigated. Among them, Si spintronics is now a promising candidate, since Si has good spin coherence, enabling novel spin-based logic systems. We have been investigating spin transport properties in degenerate Si up to room temperature (RT)),[1] and recently, spin transport in a non-degenerate n-Si at RT was successfully achieved,[2] where the doping concentration of Si was 2×10^{18} cm^{-3}. Spin drift in non-degenerate Si allows apparent modulation of Hanle spin signals under applications of bias- and gate-electric fields.[3] The magnitude of the spin signals exceeds 1 mV under an bias electric current of 1 mA, which is ten times greater than previously reported values[4] in degenerate-Si-based spin transport devices. The detail of the observation of large spin signals and other spin transport properties will be discussed in the presentation.

[1]T. Suzuki, T. Sasaki, M. Shiraishi et al., Appl. Phys. Exp. 4, 023003 (2011)
[2]T. Sasaki, T. Tahara, M. Shiraishi et al., Phys. Rev. Applied, 2, 034005 (2014).
[3]Sasaki, Phys. Rev. Applied, 2, 034005 (2014).
[4]T. Sasaki, M. Shiraishi et al., Appl. Phys. Lett. 104, 052404 (2014).

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