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**Electrical spin injection and detection by ballistic transport in MnAs / GaAs / GaAs : MnAs spin-valve hybrid heterostructures** PHAM NAM HAI, YUSUKE SAKATA, MASAFUMI YOKOYAMA, Dep. of Electronic Eng., The Univ. of Tokyo, SHINOBU OHYA, MASA AKI TANAKA, Dep. of Electronic Eng., The Univ. of Tokyo; JST — Electrical spin injection and detection by ballistic transport of spin-polarized carriers in ferromagnet (FM) / semiconductor (SC) / ferromagnet (FM) hybrid structures are key issues in semiconductor-based spintronics. By using ballistic transport of spin-polarized carriers, we can improve the spin injection / detection efficiency without using a high tunnel barrier at the FM/SC interface that decreases the current driving capability when used in active devices. In this paper, we report on the spin injection and detection by ballistic transport in perpendicular spin-valve hybrid heterostructures consisting of MnAs (20 nm) / GaAs (10 – 30 nm) / GaAs:MnAs (5 nm) grown by molecular beam epitaxy. The GaAs:MnAs layer contains ferromagnetic MnAs nanoclusters embedded in a GaAs matrix, and acts as a spin injector and a spin detector. Several % of spin-valve MR ratio was clearly observed up to 300 mV at temperature lower than 90 K. Considering the fact that all the junctions showed ohmic current-voltage characteristics, the spin-valve MR would be  $10^{-6}$  for purely diffusive transport regime. Consequently, the spin-valve MR signal of several % is caused by the ballistic transport of spin-polarized carriers in the GaAs layer.

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