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Prospects of Spin Injection in Germanium Nanowires EN-SHAO LIU, KAMRAN VARAHRAMYAN, JUNGHYO NAH, SANJAY BANERJEE, EMANUEL TUTUC, Microelectronics Research Center, University of Texas at Austin — Efficient spin injection from ferromagnetic (FM) contacts into semiconductors (SC), the prerequisite for spin-based semiconductor devices, is typically suppressed by the conductivity mismatch between the FM contact and the SC. A significant spin injection can be achieved however if the contact resistivity at the FM/SC interface is appropriately engineered [1]. We report here contact resistivity measurements of n-type germanium (Ge) nanowires (NWs) with two FM metals, namely permalloy ($Ni_{80}Fe_{20}$) and nickel (Ni), for NW doping densities between 10^{16} and $10^{20}cm^{-3}$, and for temperatures between 77K to 300K. Using back-gated two- and four-terminal measurements, we show that the contact resistivity varies from $10^{-7}(\Omega\ cm^2)$ for highly-doped NWs, to $10^{-4}(\Omega\ cm^2)$ for moderately-doped NWs. Within the framework of the spin injection theory [1], these values indicate that by optimizing the device parameters, namely the choice of FM metal, contact width, NW diameter and doping density, spin injection into Ge NWs is possible. [1] A. Fert and H. Jaffres, Phys. Rev. B. **64**, 184420 (2001)

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