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MnxGe1-x nanowires field effect transistor for spintronics applications[1] XINHAI HAN, MASAAKI OGAWA, MINGSHENG WANG, KANG L. WANG, JUSTIN D. HOLMES, University of California, Los Angeles — Group IV Dilute Magnetic Semiconductors (DMS) materials attract much attention not only because of the potential for integration of DMSs with current COMS technology, but also the enhanced spin lifetime and coherent length due to small spin-orbit coupling and lattice inversion symmetry. On the other hand, nanowires are the versatile building blocks for the assembly of functional devices to do fundamental studies in nanoscale. Here we presents Mn_xGe_{1-x} (Mn $\sim$ 0.5-1%) nanowires in which there are no detectable secondary phases and the Curie temperature (Tc) is higher than 400 K. Single Mn_xGe_{1-x} nanowire back gated field effect transistors (FETs) were fabricated and studied, and $p-$type depletion mode was observed with an on/off ratio of 10^4, threshold voltage of $\sim$ 0.53 V, maximum transconductance of 0.2 μS, and subthreshold swing (SS) of 210 mV/decade. The mobility was estimated to be around 340 cm^2/Vs. These results show the high performance of our Mn_xGe_{1-x} nanowire FET, which indicates the Mn_xGe_{1-x} nanowires could be the promising building blocks for both electrical and spintronics devices.

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