Supplementary data

Synthesis and structural characterization of vertical ferromagnetic MnAs/semiconducting InAs heterojunction nanowires

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Supplementary data includes: cross-sectional transmission electron microscope images and electron-beam diffraction patterns of vertical ferromagnetic MnAs nanocluster (NC)/semiconducting InAs heterojunction nanowires (NW) grown at 580 ºC (Fig. S1), a top view of scanning electron microscope image of vertical ferromagnetic MnAs NC/semiconducting InAs hybrid NWs grown at 490 ºC (Fig. S2), and scanning electron microscope images of vertical ferromagnetic MnAs NC/semiconducting InAs hybrid NWs grown at 400, 490, 540, and 580 ºC (Fig. S3).
Fig. S1. Cross-sectional transmission electron microscope image and electron-beam diffraction patterns of vertical ferromagnetic MnAs NC/semiconducting InAs heterojunction NWs on GaAs(111)B substrates: Points 1 and 3 for MnAs NCs, Point 2 for InAs NWs, and Point 4 for GaAs(111)B substrate. MnAs NCs were grown at 580 °C for 1 min.
**Fig. S2.** A top view of scanning electron microscope image of MnAs NCs grown at 490 °C. The inset is a schematic in which MnAs NC is drawn as a dark gray hexagon on a bright gray one of InAs NW.
Fig. S3. Bird’s-eye view of scanning electron microscope images of vertical ferromagnetic MnAs NC/semiconducting InAs hybrid NWs in which MnAs NCs were grown at (a) 580, (b) 540, (c) 490, and (d) 400 °C for 1 min. Insets in (a) – (c) are schematics in which MnAs NCs are indicated by dark gray dots in and on bright gray InAs NWs. It was highly possible that the host InAs NWs in (d) was already lower than the other NWs in (a) – (c) before the NC formation. It was difficult to estimate $D_c$ for the MnAs NCs grown at 400 °C for 1 min in the host InAs NWs because the NCs formed too closely to one another to identify. However, we observed a tendency consistent with that obtained in Fig. 5(c).