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Magnetotransport Properties of Ferromagnetic Semiconducting $Fe_{1-x}Co_xSi$ Alloy Nanowires: Building Blocks for Silicon Based Spintronics SONG JIN, University of Wisconsin-Madison — $Fe_{1-x}Co_xSi$ alloys were recently shown to be concentrated magnetic semiconductors and can be promising materials for spin injection into silicon not only because of its high spin polarization but also because of its CMOS compatibility. By developing a rational approach to synthesizing nanowires using single source precursors, we have realized a host of new transition metal silicide nanowires through chemical vapor deposition/transport. We have synthesized FeSi nanowires using $Fe(SiCl_3)_2(CO)_4$ and CoSi nanowires using $Co(SiCl_3)(CO)_4$. Building on these initial successes, we synthesized magnetic semiconducting $Fe_{1-x}Co_xSi$ alloys using mixed precursors. The as synthesized nanowires were characterized using high resolution transmission electron microscopy, energy dispersive X-ray spectroscopy, and X-ray absorption spectroscopy. The bulk $Fe_{1-x}Co_xSi$ alloys were recently shown to be concentrated magnetic semiconductors and can be suitable materials for spin injection into silicon because of its CMOS compatibility. The interesting magnetic semiconducting behavior is shown using magneto-transport and X-ray magnetic circular dichroism revealing the interesting chemistry behind the magnetic properties. These novel magnetic semiconducting silicide nanowires are exploited as building blocks for silicon-based spintronic nanodevices.

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