Abstract Submitted
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Optical Studies of Single $Zn_{1-x}Mn_xSe$ Nanowires Synthesized by Chemical Vapor Deposition D. M. ZHANG, B. J. COOLEY, H. R. GUTIERREZ, N. SAMARTH, Dept. of Physics, Penn State University, University Park PA 16802 — Magnetic semiconductor nano-filaments provide interesting model systems for fundamental studies of quasi-one-dimensional spintronics [1]. Here, we report the growth and characterization of single crystal $Zn_{1-x}Mn_xSe$ nanowires (NWs) and nanobelts fabricated on Si and quartz substrates via the vapor-solid-liquid mechanism during chemical vapor deposition. We obtain NWs that are tens of μm in length, with diameters in the range 40 nm$-$100 nm. The Mn concentration can be varied over the range $0 \leq x \leq 0.5$ by controlling the substrate temperature. We carry out Raman and photoluminescence (PL) measurements on single NWs supported over the holes of a transmission electron microscope (TEM) grid. This allows us to directly correlate optical properties with structural characteristics of the NWs obtained using TEM. Room temperature micro-Raman measurements on single NWs probe the phonon modes, while low temperature PL spectra show clear evidence for the substitutional incorporation of Mn into the ZnSe lattice. This work is supported by NSF-MRSEC.

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