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Growth and Characterization of Coherently Strained Si-Si$_x$Ge$_{1-x}$ Core-Shell Nanowire Heterostructures DAVID DILLEN, KYOUNGHWAN KIM, EMANUEL TUTUC, Univ of Texas, Austin — The large valence band offset in Ge-Si$_x$Ge$_{1-x}$ core-shell nanowires has provided an interesting platform for the study of quasi one-dimensional hole-confined systems, and has led to the demonstration of high-performance electronic devices. Progress in the development of electron-confined systems using Group-IV core-shell structures has, however, been much slower. Coherently strained Si-Si$_x$Ge$_{1-x}$ core-shell nanowires represent one possible radial heterostructure where a positive shell-to-core conduction band offset, beneficial for quantum confinement of electrons in the Si core, may be realized. We discuss the growth of strained Si-Si$_x$Ge$_{1-x}$ core-shell nanowires with tunable shell composition using vapor-liquid-solid growth for the Si nanowire core, followed *in-situ* by Si$_x$Ge$_{1-x}$ shell growth. Transmission electron microscopy reveals a single crystal nanowire structure, evincing an epitaxial shell growth. Raman spectroscopy reveals a red-shift of the core Si-Si Raman mode, which depends on the shell composition and nanowire thickness, indicating coherent tensile strain in the Si core.

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