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***In Situ* Resistivity of Endotaxial $FeSi_2$ Nanowires on Si(110)** PETER BENNETT, Arizona State University, SAM TOBLER, Dixie State College — We present *in situ* Ultra-High Vacuum (UHV) measurements of the resistivity ρ of self-assembled endotaxial $FeSi_2$ nanowires (NWs) on Si(110) using a variable-spacing two-point method with a moveable Scanning Tunneling Microscope (STM) tip and fixed contact pad. The resistivity at room temperature was found to be nearly constant down to NW width W = 4 nm, but rose sharply to nearly double the bulk value at W = 3nm. These data are not well-fit by a simple Fuch-Sondheimer model for boundary scattering, suggesting that other factors, possibly quantum effects, may be significant at the smallest dimensions. For a NW width of 4 nm, partial oxidation increased ρ by approximately 50%, while cooling from 300K to 150K decreased ρ by approximately 10%. The relative insensitivity of ρ to NW size or oxidation or cooling is attributed to a high concentration of vacancies in the $FeSi_2$ structure, with a correspondingly short length for inelastic electron scattering, which obscures boundary scattering except in the smallest NWs. It is remarkable that the vacancy concentration persists in very small structures.

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