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Manganese silicide thin films on Si(001). MICHAEL KRAUSE, ANDREW STOLLENWERK, VINCENT LABELLA, College of Nanoscale Science and Engineering, University at Albany-SUNY, Albany, New York 12203 — Theoretical considerations suggest that epitaxial MnSi thin films should order ferromagnetically on Si(001). This substantiates the hope that the Mn-Si system might be utilized as spin injectors through a Schottky barrier in future spintronics applications. Both thin and ultrathin films of manganese silicide on Si(001) have been investigated with different STM based techniques. In the ultrathin film regime three-dimensional manganese silicide islands form upon annealing. No closed and flat films have been found. With increasing annealing time the density of islands per surface area decreases while the average size of the remaining islands increases. The time dependence of the coarsening shows the typical characteristics of surface diffusion limited Ostwald Ripening. The activation energy for the clustering of Mn on Si(001) has been found to be 2.6 eV. Thicker (6 nm) continuous MnSi films were investigated using ballistic electron emission microscopy (BEEM) at 80 K to study the electrical properties. The BEEM spectra indicate a complex band structure at the MnSi/Si(001) interface. The MnSi overlayers show a high elastic scattering rate compared to Au/Si(001).

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