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Local structure and magnetic properties of ultrathin Mn films grown on Si(001) SAMER KAHWAJI, THEODORE MONCHESKY, Dalhousie University, Halifax, Canada, DARYL CROZIER, ROBERT GORDON, Simon Fraser University, Burnaby, Canada — We report on the structural and magnetic properties of ultrathin Mn layers deposited onto Si(001) by molecular beam epitaxy (MBE) at low temperature. X-ray absorption fine structure (XAFS) studies reveal that the structure of the silicide layer that forms depends on the growth temperature of the capping layer. A capping layer grown at 200 °C on 0.35 monolayer (ML) Mn results in a metastable MnSi phase with a B2-like (CsCl) structure, whereas a cap grown at room temperature on 0.5 ML followed by annealing at 200 °C produces a lower coordinated MnSi phase with a B20-like structure. Increasing the Mn thickness from 0.5 to 4 monolayers does not trigger a structural transformation but drives the structure closer to MnSi-B20. Using SQUID magnetometry, we show that the sample with B2-like structure has the largest Mn magnetic moment of $0.33\mu_B$/Mn at T=2 K, and a Curie temperature T_C above 250 K. MnSi-B20 layers showed lower moments and much lower T_C's, in-line with those reported for MnSi-B20 thin films.

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