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Thermodynamics of Co/Cr superlattices[1] T. MUKHERJEE, S. SAHOO, R. SKOMSKI, D.J. SELLMYER, CH. BINEK, University of Nebraska-Lincoln — Progress in ultra thin film growth has resulted in many novel surface and interface induced properties of artificial heterostuctures. Here, we study magnetic superlattices of ultrathin Co and Cr films grown by Molecular Beam Epitaxy methodology at a base pressure below 1×10^{-10} mbar. Our approach is based on controlling two distinct magnetic degrees of freedom. First, the critical temperature, T_c, of individual Co films is tailored via geometrical confinement of the correlation length perpendicular to the film. Various thickness dependent values, T_c(d), between zero and the bulk Curie temperature of 1388 K are realized. Second, the T_c-tailored Co films are antiferromagnetically coupled through Cr interlayer films. The oscillating coupling strength is tailored via the Cr interlayer thickness. The resulting thermodynamic properties of such Co/Cr superlattices are studied with the help of SQUID magnetometry. Particular emphasis is laid on tailoring magnetic entropy changes in the vicinity of room temperature. X-ray diffraction and X-ray reflectivity are used to correlate structural data with the magnetic properties.

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