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Cleavable magnetic materials: $CrTe_3$ and $CrCl_3$[1] MICHAEL MCGUIRE, JIAQIANG YAN, VALENTINO COOPER, OVIDIU GARLEA, BRIAN SALES, Oak Ridge National Laboratory — Two dimensional magnetic materials are needed for engineering enhanced functionality into van der Waals heterostructures. Here we describe two easily cleavable materials relevant to such research: $CrTe_3$ and $CrCl_3$. Experimental results include the field and temperature dependent crystallographic and magnetic properties and analysis of elastic and inelastic neutron scattering data. $CrTe_3$ contains lozenge shaped Cr_4 tetramers and Te−Te bonding. We see evidence of strong intra-tetramer exchange as well as significant long range magnetic interactions. $CrCl_3$ is an antiferromagnet (T_N = 17 K) with a honeycomb lattice of Cr. We find that the magnetic order develops in two steps. Due to the low magnetic anisotropy, the 3 Bohr magneton moments on Cr can be fully polarized in any direction with magnetic fields of less than 5 kOe, making this compound particularly interesting for devices incorporating magnetic proximity effects.

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