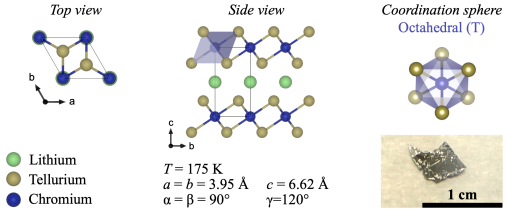
# Synthesis and Anisotropic Magnetic Properties of $LiCrTe_2$ Single Crystals with a Triangular-Lattice Antiferromagnetic Structure

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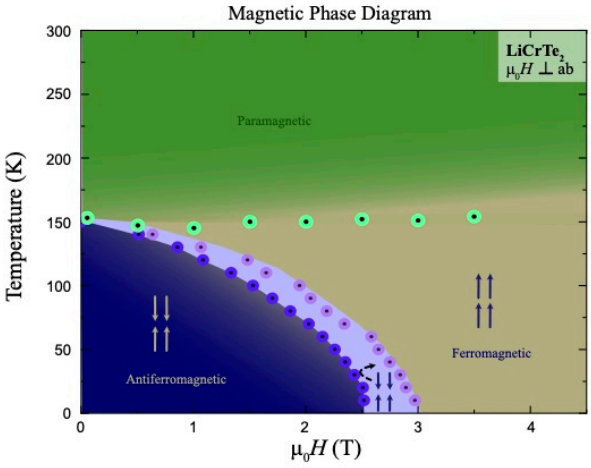
$LiCrTe_2$ is an antiferromagnetic compound and was synthesized as powder for the first time in 2016 by *Kobayashi et al* because of the expected exotic ground states and physical properties that come along with two-dimensional triangular-lattice compounds.[1,2] $LiCrTe_2$ can be understood as a Li intercalated version of the thermodynamically metastable 1T-$CrTe_2$ van der Waals compound and was believed to have a helical spin structure.[3]

We report on the single crystal synthesis of $LiCrTe_2$ employing a Te/Li-flux and find the transition temperature to be substantially higher (~150 K) then previously reported (70 K).[4]




With neutron powder diffraction measurements, we were able to determine the Li content as stoichiometric and elucidate the long-range low temperature magnetic structure as being A-type antiferromagnetic, with the easy axis along the *c*-direction. This is consistent with our DFT calculations. We have determined the magnetic phase diagram of this material using detailed orientation dependent magnetization measurements and reveal a pronounced metamagnetic transition for $H \perp ab$ with a critical field of $\mu H_{MM}(5\ K) \approx 2.5$ T.

Our findings suggest that $LiCrTe_2$ is a promising material for exploring the interplay between crystal structure and magnetism, and could have potential applications in spin-based 2D devices.




1. Kobayashi S, Ueda H, Michioka C and Yoshimura K, *Inorg. Chem.*, **2016**, 55 7407–13.
2. Nocerino E, Kobayashi S, Witteveen C et al, *arXiv*, ***2022***, arXiv:2211.06864
3. Nocerino E, Witteveen C, Kobayashi S et al, *Sci. Rep.*, **2022**, 12 21657
4. Witteveen C, Nocerino E, López-Paz S et al, *arXiv*, **2023**, arXiv:2304.01767