

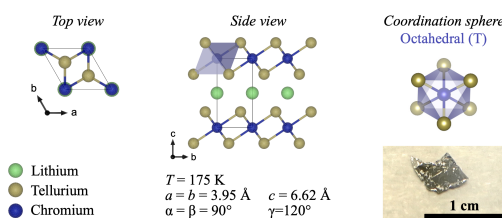
## Synthesis and Anisotropic Magnetic Properties of $\text{LiCrTe}_2$ Single Crystals with a Triangular-Lattice Antiferromagnetic Structure

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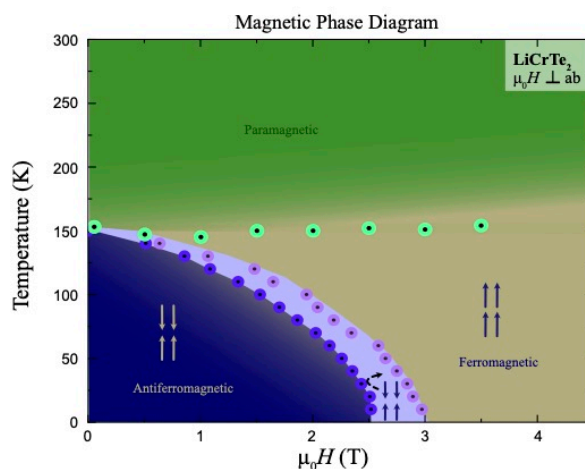
$\text{LiCrTe}_2$  is an antiferromagnetic compound and was synthesized as powder for the first time in 2016 by Kobayashi *et al* because of the expected exotic ground states and physical properties that come along with two-dimensional triangular-lattice compounds.<sup>[1,2]</sup>  $\text{LiCrTe}_2$  can be understood as a Li intercalated version of the thermodynamically metastable 1T-CrTe<sub>2</sub> van der Waals compound and was believed to have a helical spin structure.<sup>[3]</sup>

We report on the single crystal synthesis of  $\text{LiCrTe}_2$  employing a Te/Li-flux and find the transition temperature to be substantially higher ( $\sim 150$  K) then previously reported (70 K).<sup>[4]</sup>



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  $\mu H_{\text{MM}}(5 \text{ K}) \approx 2.5$  T.

Our findings suggest that  $\text{LiCrTe}_2$  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](https://arxiv.org/abs/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](https://arxiv.org/abs/2304.01767)