Synthesis and Anisotropic Magnetic Properties of LiCrTe₂ 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]

Top vie

Coordination sphere

Octahedral (T

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

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, <u>Witteveen C</u> et al, *arXiv*, **2022**, arXiv:2211.06864
- 3. Nocerino E, <u>Witteveen C</u>, Kobayashi S et al, Sci. Rep., **2022**, <u>12 21657</u>
- 4. Witteveen C, Nocerino E, López-Paz S et al, arXiv, 2023, arXiv:2304.01767