Strain-Mediated Lattice Reconstruction Enhances Ferromagnetism in Cr2Ge2Te6/WTe2 van der Waals Heterobilayers

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Van der Waals (vdW) heterostructures enable tailored electronic and magnetic phases by stacking atomically thin layers with pristine interfaces [1–3]. Here, we investigate fully 2D $Cr_2Ge_2Te_6/WTe_2$ heterostructures and identify a strong enhancement of ferromagnetism in $Cr_2Ge_2Te_6$ (CGT). Magnetotransport measurements across multiple devices with WTe_2 thicknesses ranging from monolayer to bulk reveal a robust anomalous Hall effect together with a more than twofold increase of the Curie temperature and substantially enhanced coercive fields (Figure 1). Interface microscopy confirms chemically abrupt vdW interfaces with no detectable interdiffusion, while control experiments rule out processing- or stray-field-induced artifacts. Our experiments and theoretical calculations demonstrate that interfacial charge transfer renders CGT conductive and that proximity-induced lattice distortions in CGT enhance exchange and magnetocrystalline anisotropy. These results establish strain-mediated lattice reconstruction as a practical strategy for engineering high-temperature magnetic order in 2D heterostructures [3–5] and clarify that proximity effects in vdW stacks can be governed by modifications within the magnetic layer itself.

References

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Figures

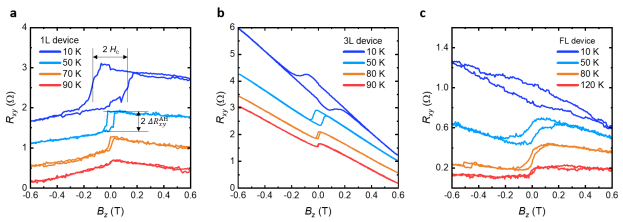

Figure 1: Anomalous Hall effect (AHE) in the a) 1L, b) 3L and c) FL devices. Each panel shows Rxy, as a function of out-of-plane magnetic field, Bz, at representative temperatures, showing hysteresis above 65 K (pristine CGT Curie temperature). Curves are offset vertically for clarity.