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Raman Signature of Layer Number and Crystal Quality of Chromium Triiodide GAIHUA YE, ZHIPENG YE, ERIC WAUER, FABIN DIAZ, DAVID TAUZIN, RUI HE, Texas Tech University, HYUN KIM, BOWEN YANG, ADAM TSEN, University of Waerloo, Canada, WENCAN JIN, LIUYAN ZHAO, University of Michigan — Chromium triiodide (CrI_3) has recently been shown to host Ising ferromagnetism down to the monolayer limit, which stimulates numerous ideas of device applications based on this two-dimensional (2D) ferromagnet. We performed polarized Raman spectroscopy studies on phonon modes as a function of CrI_3 thickness and ambient exposure time. In pristine samples, Raman selection rules for intralayer phonons remain the same not only above and below the structural phase transition, but also in bulk and atomic layers. This indicates that the interlayer coupling plays a negligible role on the symmetry properties of intralayer phonons. Despite the consistency of selection rules between pristine bulk and thin layer CrI_3, the ratio between the $A_g(C_{3i})$ and $E_g(C_{3i})$ modes, at ˜128 and ˜107 cm^{-1} respectively, is a good indicator for labeling the layer numbers at room temperature, while the frequency separations between the magnetic excitation modes and its neighboring A_g phonon modes serve as another thickness marker below magnetic phase transition temperature T_C. Raman spectra from CrI_3 crystals after moderate ambient exposure are indistinguishable from that of the pristine CrI_3 at room temperature, but exhibit significant differences below T_C

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