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Physical properties of the van der Waals bonded ferromagnet $Fe_{3-x}GeTe_2$ ANDREW MAY, Materials Science and Technology Division, ORNL, STUART CALDER, Quantum Condensed Matter Division, ORNL, CLAUDIA CANTONI, Materials Science and Technology Division, ORNL, HUIBO CAO, Quantum Condensed Matter Division, ORNL, MICHAEL MCGUIRE, Materials Science and Technology Division, ORNL — Fe_3GeTe_2 is an itinerant ferromagnetic with a layered structure held together by van der Waals bonds. The material has been synthesized using a flux-growth technique that results in large single crystals suitable for neutron scattering, and its magnetic structure and phase diagram have been investigated. The flux-grown crystals possess a Curie temperature $T_C \approx 150\,\mathrm{K}$, which is less than that reported for polycrystalline Fe_3GeTe_2 with $T_C \approx 230\,\mathrm{K}$. The difference is explained by intrinsic Fe-deficiency in these single crystals. This talk will summarize the physical properties of the flux grown single crystals and a series of polycrystalline samples with varying concentrations of Fe, which reveal how Fe content is correlated to structural parameters and T_C. In combination with the magnetic properties, Hall effect and thermoelectric data reveal that $Fe_{3-x}GeTe_2$ compounds are multi-carrier type, itinerant ferromagnets. Research supported by the US DOE, Office of Science, Basic Energy Sciences, Materials Sciences and Engineering Division.

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