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Specific Heat of $(Ca_{1-x}Sr_x)_3Ru_2O_7$ Single Crystals[1]
V. VARADARAJAN, S. CHIKARA, V. DURAIRAJ, X.N. LIN, G. CAO, J.W. BRILL, University of Kentucky — We have measured the specific heat of crystals of $(Ca_{1-x}Sr_x)_3Ru_2O_7$using ac- and relaxation-time calorimetry. Special emphasis was placed on the characterization of the Néel (T_N=56 K) and structural (T_c = 48 K) phase transitions in the pure, x=0 material. While the latter is believed to be first order, detailed measurements under different experimental conditions suggest that all the latent heat (with L $\sim$ 0.3 R) is being captured in a broadened peak in the effective heat capacity. The specific heat has a mean-field-like step at T_N, but its magntitude ($\Delta c_P \sim$ R) is too large to be associated with a conventional itinerant electron (e.g. spin-density-wave) antiferromagnetic transition, while its entropy is too small to be associated with full ordering of localized spins. The T_N transition broadens with Sr substitution while its magnitude decreases slowly. On the other hand, the entropy change associated with the T_c transition decreases rapidly with Sr substitution and is not observable for our x=0.58 sample.

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