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Specific heat study of the effect of cooling rate on the superconducting and normal states of κ-$(ET)_2Cu[N(CN)_2]Br$ ANTONY CARRINGTON, O.J. TAYLOR, C.M.J. ANDREW, University of Bristol, R.W. GIANNETTA, T. OLHEISER, University of Illinois at Urbana-Champaign, J. SCHLUETER, Argonne National Lab. — It is well known that the T_c of κ-$(ET)_2Cu[N(CN)_2]Br$ is dependent on the rate it is cooled in the temperature range 80-60 K. One interpretation of this effect is that rapid cooling introduces disorder which suppresses T_c because of its unconventional nature. Here we present a specific heat study of this effect in both hydrogenated and deuterated samples. We find that not only does T_c depend on the cooling rate, but that the normal-state Sommerfeld coefficient, γ, is strongly suppressed (by up to a factor 2) with rapid cooling. The data indicate that rapid cooling induces macroscopic phase separation between an insulating and metallic / superconducting phase at low temperature. The field dependence of γ for the deuterated sample is highly unusual. As the field is increased it initially increases in a conventional way then suddenly collapses to a small value. We interpret this as evidence for a field induced superconductor-insulator transition.

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