Specific Heat Study of the Non-centrosymmetric Superconductor $LaPt_3Si$ in Magnetic Fields

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We have measured the specific heat of poly- and single-crystalline $LaPt_3Si$ samples in various magnetic fields. In zero magnetic field, we observed distinct superconducting transitions at $T_c \sim 0.64$ K and 0.61 K for the poly- and single crystals, respectively. Temperature dependences of the specific heat C of both samples around T_c resembled each other and could be well described by an exponential equation for a conventional superconductor at low temperatures. In a magnetic field, a characteristic peak of C/T appeared while the superconducting transition temperature was considerably suppressed. These trends were pronounced for the single crystal. The transition of the polycrystal became broad above 40 Oe and a characteristic tail appeared at temperatures above the peak of C/T. We suggest that the tail is induced by domains that have crystallographic disorders of the non-centrosymmetry and a higher critical magnetic field than that of the bulk. These domains became superconducting at temperatures above the peak of C/T, and then formed the tail. Both the poly- and single-crystalline $LaPt_3Si$ samples have been found to show characteristics that are in-between those of type-I and type-II superconductors.