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Schottky Anomaly Observed in NMR of Metallic Si:P MINKI JEONG, MYEONGHUN SONG, Dept. of Physics, KAIST, Korea, TOMOHIRO UENO, School of Health Sciences, Kyoto Univ., Japan, MENG-YUAN CHEN, Dept. of Physics, Kyoto Univ., Japan, TAKAO MIZUSAKI, Toyota Physical and Chemical Research Inst., Japan, YUTAKA SASAKI, AKIRA MATSUBARA, Dept. of Physics, Kyoto Univ., Japan, KOHJI FUKUDA, School of Health Sciences, Kyoto Univ., Japan, MEIRO CHIBA, Dept. of Applied Physics, Fukui Univ., Japan, SOONCHIL LEE, Dept. of Physics, KAIST, Korea — We studied the ^{31}P nuclear magnetic relaxation of metallic Si:P with doping concentration of $\sim 6 \times 10^{19}\mathrm{cm}^{-3}$ at very low temperatures from 3.5 K down to 45 mK and magnetic field of 7.4 T. Below 1 K, Nuclear spin-lattice relaxation studied by inversion recovery method showed two-step recovery in magnetization due to the effects of finite heat capacity of conducting electrons. Under given experimental conditions, the heat capacity of nuclear spins becomes comparable to that of conducting electrons, so the conducting electrons cannot be considered as a heat reservoir. Still, however, the initial magnetization recovery or the corresponding time constant T_1 followed the Korringas law very well. Nuclear spin-spin relaxation time T_2 above 1.5 K was 14 msec independent of temperature and explained by dipolar fields from ^{31}P and ^{29}Si nuclear spins. As temperature decreased below 1.5 K, however, T_2 started falling and again became constant of $\sim$ 1.3 msec below 600 mK.

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