HIGH MAGNETIC FIELD STUDIES OF THE SPIN-PEIERLS STATE IN THE ORGANIC CONDUCTOR $Per_2[Pt(MNT)_2]$

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$Per_2[Pt(mnt)_2]$ is a quasi-one dimensional organic conductor that consists of metallic perylene chains and insulating $Pt(mnt)_2$ chains with localized Pt spins (S = ½). Under ambient conditions, the perylene chains undergo a metal-insulator transition at $T_c \sim 8$ K due to the formation of a charge density wave (CDW), while the $Pt(mnt)_2$ chains undergo a spin-Peierls transition at the sample temperature. To investigate the magnetic properties of the spin chains in this material a tunnel diode oscillator (TDO) was used. A TDO is a self-resonating LC circuit drive by a tunnel diode. For this work, aligned single crystals of $Per_2[Pt(mnt)_2]$ were placed inside of the inductor coil of the TDO, which resulted in a change in the resonant frequency of the circuit due to changes in the magnetic susceptibility of the sample. [1]

The experimental results obtained by using the TDO technique, in conjunction with previous resistivity studies [2], suggest a coupling of the spin-Peierls and charge density wave states below 8 K and up to 20 T, above which both states are suppressed. At fields above 20 T a transition into a second spin state occurs, which coincides with a field induced insulating state in the perylene chains. These results not only suggest a strong coupling between the segregated charge and spin chains but also provide support to the idea that the charge density wave is needed to support the spin-Peierls state even in the low-temperature, low-magnetic field state. [3, 4]

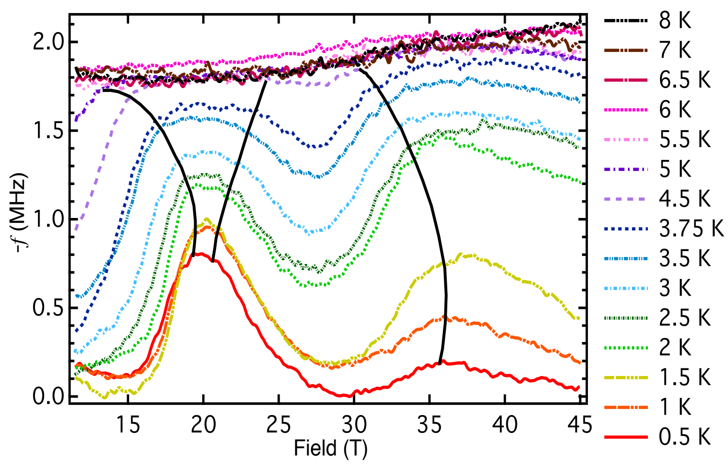

Figure 1. The change in TDO frequency as a function of magnetic field for a range of temperatures. The black lines are guides to the eye to indicate transitions into and out of the spin-Peierls state.

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