

Low Temperature Super-lattice Structure in β'' -(BEDT-TTF)(TCNQ)

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β'' -(BEDT-TTF)(TCNQ) is a 1:1 compound of BEDT-TTF and TCNQ molecules forming BEDT-TTF and TCNQ sheets alternating along the **b**-axis. In the both sheets, the stacking direction is the **a**-axis. The degree of charge transfer from BEDT-TTF to TCNQ was estimated 0.5. From the electric structural view point, the BEDT-TTF layer has a Q1D FS along the **c**-axis owing to side-by-side interaction whereas the TCNQ layer has a Q1D FS along the column **a**-axis [1]. The Optical and structural study has revealed occurrence of the charge ordering (CO) in BEDT-TTF at RT with $\mathbf{q} = (1/2 \ 0 \ 1/2)$ super-lattice formation. Surprisingly, this CO state disappears with small resistivity anomaly around 170K by cooling [2]. Furthermore, The resistivity shows anomaly around 80K and 20K[1,2]. From SdH, reconstruction of BEDT-TTF Q1D FS has been proposed[3]. Below 20K, a steep decrease in magnetic susceptibility has been observed[2,4].

Interested in the anomalous properties below 20K, we performed highly sensitive X-ray diffuse scattering measurements using monochromatic 'Laue' camera. Below 22K new satellite reflections with modulation vector $\mathbf{q}=(1/4 \ ? \ 1/2)$ emerged. This modulation wave vector is very interesting: it can nearly nest a Q1D BEDT-TTF FS. Furthermore tetramerization of TCNQ molecules induced by this modulation can make spin singlet state. In this sense, this modulation is a key to understand the electronic property in this compounds at low temperature.

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