Competition of Two Charge Ordering Domains in \( \theta-(\text{BEDT-TTF})_2\text{RbZn(SCN)}_4 \)

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In the organic 2D system, the charge frustration and the charge ordering (CO) in quasi-triangular lattice are important problems. Concerning these problems, \( \theta-(\text{BEDT-TTF})_2\text{Cs(Zn or Co)(SCN)}_4 \) is focused materials owing to their giant non-linear conductivity\cite{1} and melting of two-fold horizontal CO\((q_2)\) only by current\cite{2}; there are two CO’s in these materials. These behaviors are not due to simple self-heating by Joule effect but to inherent current effect\cite{3}. To deepen our understanding, we are looking for another material exhibiting similar interesting behavior induced by current.

Recently we noticed to be able to freeze \( 3 \times 4 \) short ranged CO\( (q_1') \), and realize lower resistive state by suppressing \( q_2 \) CO in \( \theta-(\text{BEDT-TTF})_2\text{RbZn(SCN)}_4 \) with ultra rapid cooling. Around 140 K a monotonic decrease in diffuse scattering intensity of the \( q_1' \) modulation and a monotonic increase in the \( q_2 \) intensity was observed with a passage of time. Furthermore the resistivity corresponds well to the size of the \( q_2 \) domain. These results show the \( q_1' \) domain is metallic (or lower resistive) and the \( q_2 \) domain is insulating. The competing CO’s clearly observed in the title material will be a key to understand the non-linear electronic property in these compounds at low temperatures.

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