

Supplementary Materials

Supplementary Movies: To see an individual frame, pause the movie and use the “left” and “right” arrow keys for fine control.

Movie S1: MFM images and *in situ* 2-probe resistance (R) measurements taken as the applied magnetic field is changed at 6.8 K after ZFC. The background image of the movie is a polarized optical microscope image of the same area at room temperature. Dashed lines are drawn on top of twin boundaries as guides to the eye. The magnetic field value for each MFM image is marked by a black dot on the $R(H)$ curve. For the first five images ($H < 1.6$ T), R is too big to measure.

Movie S2: MFM images taken during warming in a 1 T field after ZFC. The background image of the movie is a polarized optical microscope image of the same area. The temperature value and the colour scale value are shown on top of each MFM image. Dashed lines are drawn on top of twin boundaries as guides to the eye.

Movie S3: MFM images and *in situ* 4-probe resistance (R) measurement during warming in a 1 T field after cooling in a 1 T field. The background image of the movie is a polarized optical microscope image of the same area. Dashed lines are drawn on top of twin boundaries as guides to the eye. The temperature value for each MFM image is marked by a red dot on the $R(T)$ curve.

Supplementary Figures

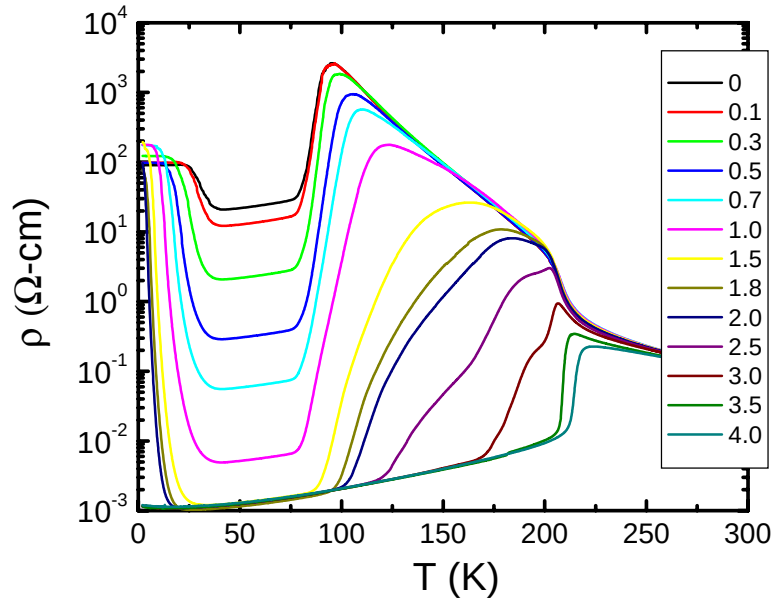


Figure S1. Semi-logarithmic plot of $\rho(T)$ measured during warming in various magnetic fields up to $\mu_0 H = 4.0$ T. This sample is from the was cut from the same boule as the sample measured in the MFM studies. For each field measurement, the sample was first cooled in zero magnetic field, then measured on warming (ZFC-W). The sharp drop ρ of at low temperature marks the glass temperature, T_G , i.e. the melting of the frozen state. The rise of ρ at higher temperature marks the superheating temperature, T^{**} . A small drop of ρ at about 220 K marks the charge ordering (CO) temperature.

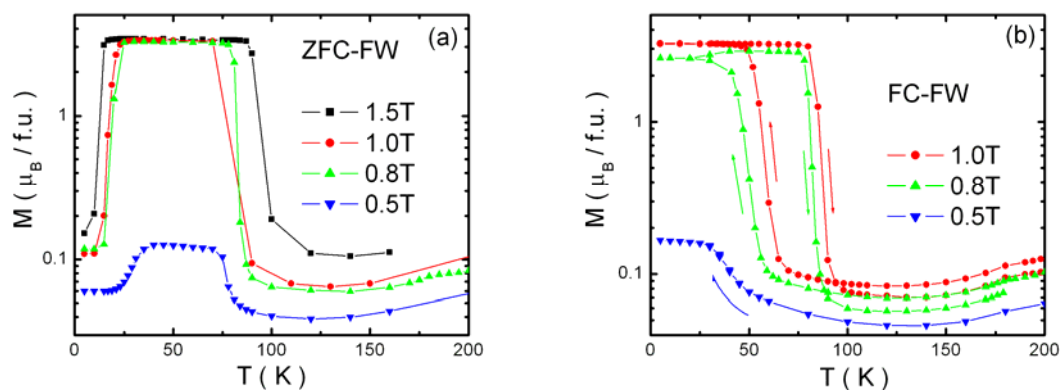


Figure S2. Semi-logarithmic plot of $M(T)$ measured in various field values. **a:** $M(T)$ measured in ZFC-FW at 0.5, 0.8, 1.0, and 1.5 T. The rise of M during ZFC-FW marks the glass temperature, T_G , while the sharp drop of M marks the superheating temperature, T^{**} . **b:** $M(T)$ measured in FC-FW at 0.5, 0.8, and 1.0 T. The supercooling transition T^* , marked by the rise of M during FC is interrupted by the glass transition, especially for 0.5 and 0.8 T data. This frozen state is also evident in the warming curve taken at 0.8 T, where there is an additional rise of M .

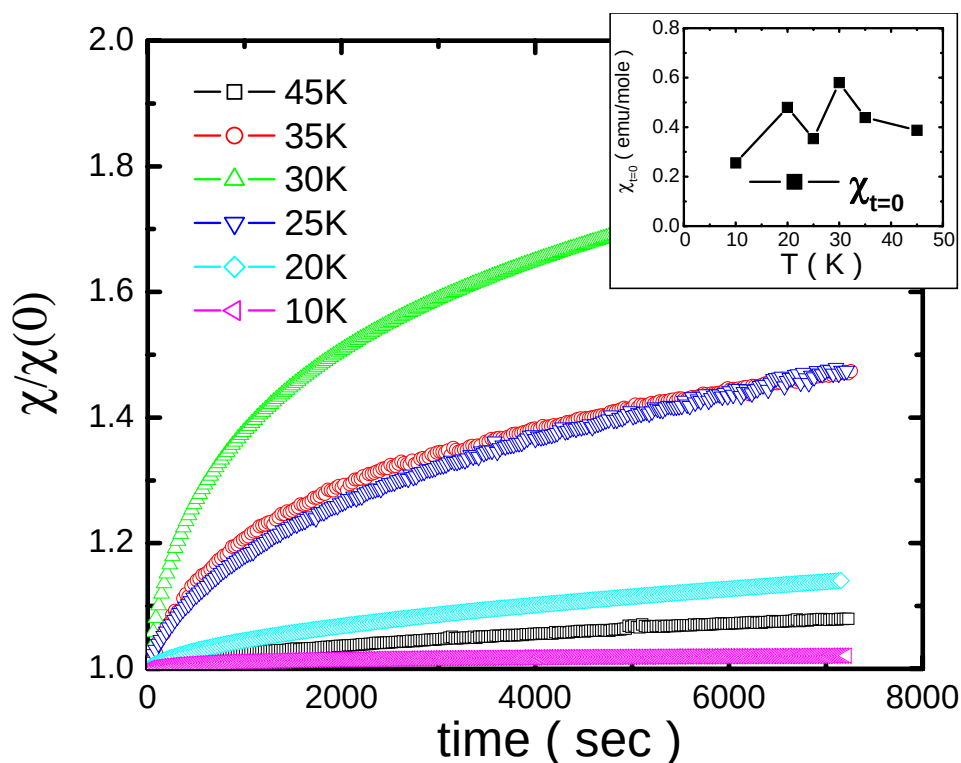


Figure S3. Time dependence of normalized SQUID susceptibility $\chi(t)/\chi(0)$ data measured at different temperature values: 10, 20, 25, 30, 35, and 45 K. This sample was cut from the same boule as the sample used in the MFM studies. In each measurement, the sample is cooled to 8 K from room temperature in zero field, then warmed to the target temperature in the presence of a 0.01 T magnetic field. After the temperature is stabilized, the sample magnetization is measured versus time. As the temperature is lowered from 45 K, the trend of the supercooling transition is signified by the decrease of relaxation time. However, the relaxation is significantly slowed down below 30K, likely due to the freezing of the supercooling transition, i.e. the glass transition. Inset: the initial values of the susceptibility for each relaxation measurement.