Observation of Griffiths-like phase and magnetocaloric effect in the disordered Y_2CoCrO_6 double perovskite

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Supporting Information

Note S1. Fourier-transform infrared spectroscopy (FTIR) and thermal stability analyses

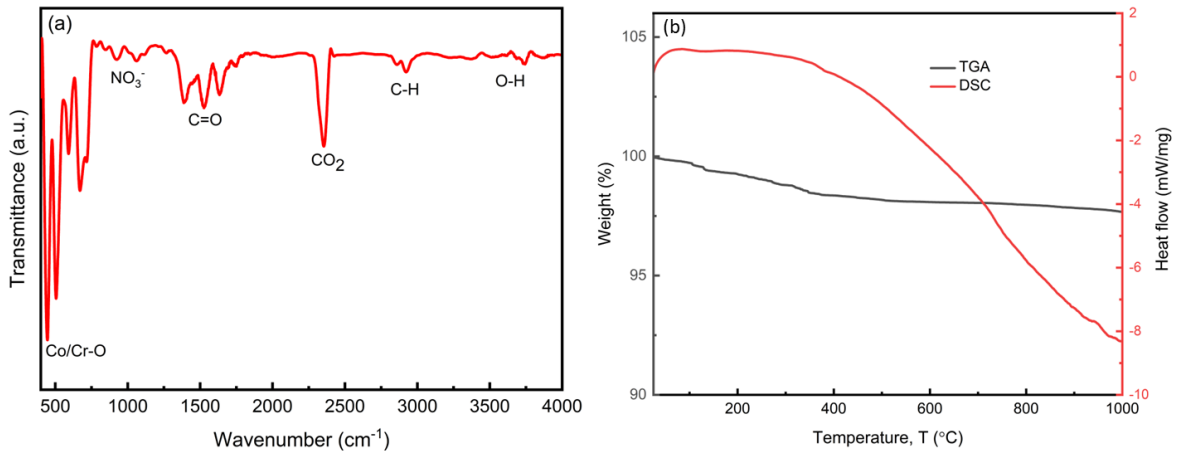

Figure S1. (a) FTIR spectra and (b) DSC/TGA curve of YCCO nanoparticles.

Fig. s1(a) demonstrates the FTIR spectra of YCCO double perovskite. The absorption peaks at 445 cm^{-1}, 505 cm^{-1}, 591 cm^{-1}, 670 cm^{-1}, and 716 cm^{-1} can be attributed to the stretching and bending vibrations of the metal-oxygen (Co/Cr-O) bonds within the CoO_6/CrO_6 octahedra of the YCCO material.[1–3] The peaks found between 783 cm^{-1} and 1267 cm^{-1} in the FTIR spectrum of the material could be due to the presence of NO^{3-} ions, indicating that the material has the capability to trap or incorporate NO^{3-} ions.[4] The spectral data within the 1387-1748 cm^{-1} range demonstrate the detection of carbonate ions resulting from the chemisorption of atmospheric CO_2.[1] The peak at 2354 cm^{-1} relates to C=O vibrations.[1] The peak at 3511 cm^{-1} is an indication of the O-H stretching vibration and shows the existence of hydroxyl groups (-OH) or water molecules (H_2O) in the material.[5] The presence of these characteristic peaks in the FTIR spectrum indicates that the phase pure YCCO perovskite was formed with the desired chemical composition and bonding arrangements, which is further supported by the XRD result.

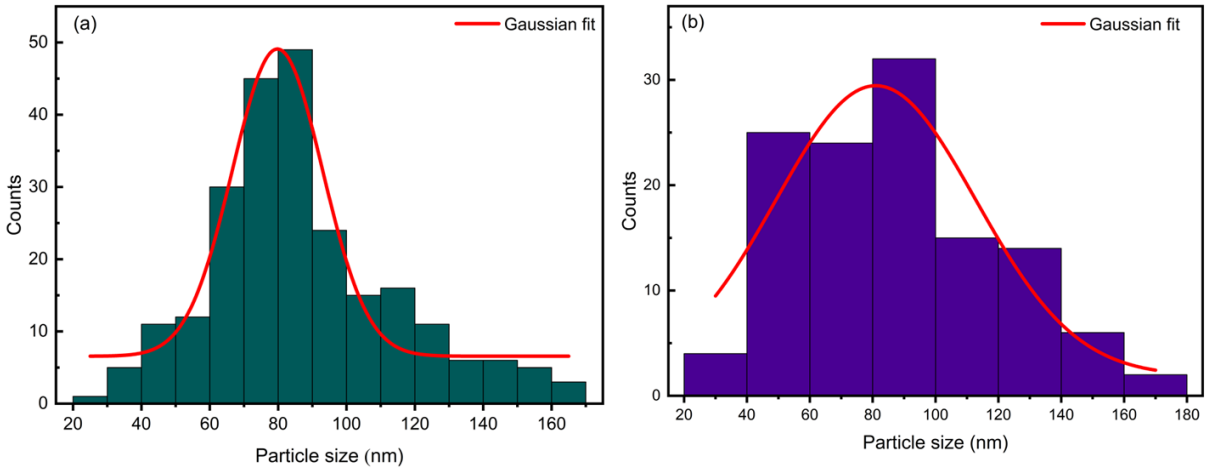

Figure S2. Particles size distribution histogram of (a) FESEM and (b) TEM imaging.

Table 1: The mass and atom count of different elements in YCCO material

Element	Mass of element in theoretically (%)	Mass of element in experimentally (%)	Atom count of element in theoretically (%)	Atom count of element in experimentally (%)
Y	46.22	41.84	20	16.92
Co	15.32	19.29	10	11.51
Cr	13.51	8.89	10	6.01
O	24.95	29.98	60	65.92
Total	100	100	100	100

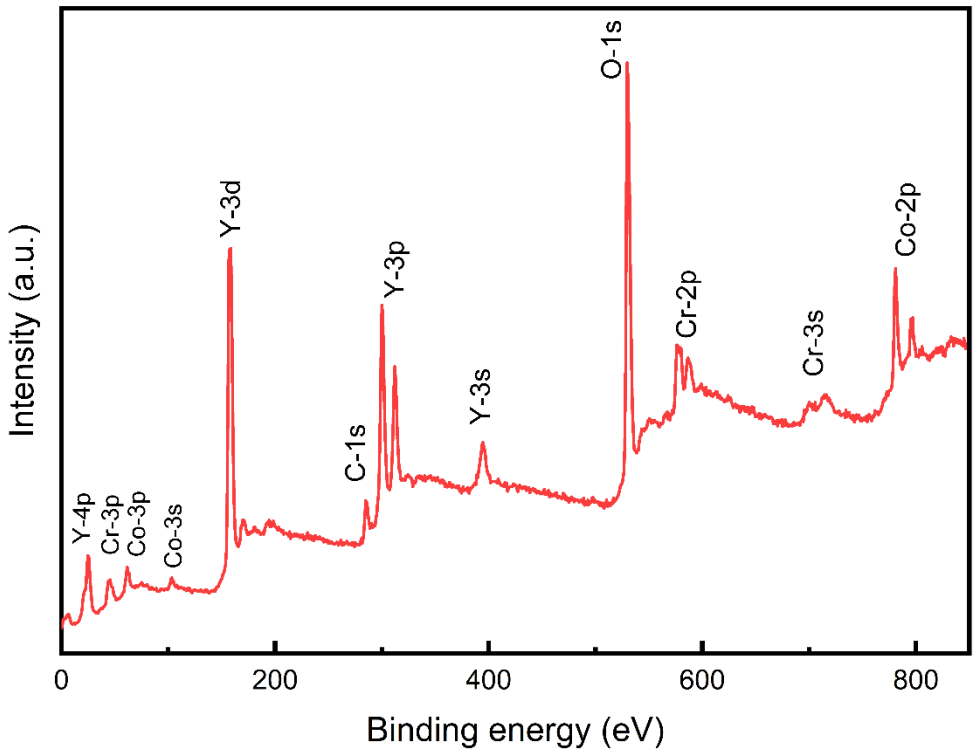

Figure S3. XPS full survey spectrum of YCCO nanoparticles.

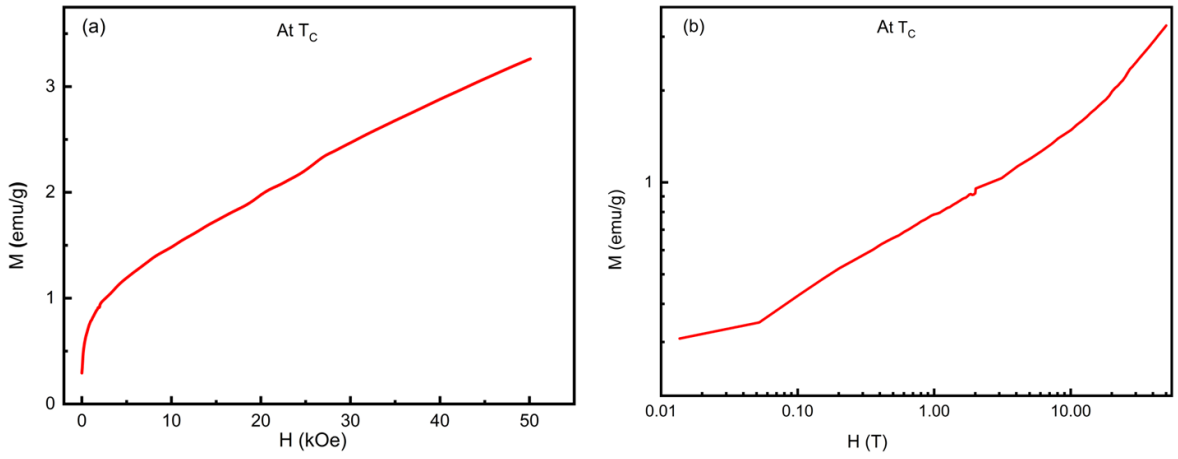

Figure S4. (a) & (b) Critical Isotherm and the log-log plot of the critical isotherm of the YCOO compound.

References

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