Observation of slow relaxation of the magnetization and hysteresis loop in antiferromagnetic ordered phase of a 2D framework based on Co^{II} magnetic chains

Shi-Yuan Zhang,[a] Wei Shi,*[a] Yanhua Lan,[b] Na Xu,[a] Xiao-Qing Zhao,[a] Annie K. Powell,[b] Bin Zhao,[a] Peng Cheng,*[a] Dai-Zheng Liao,[a] and Shi-Ping Yan[a]

[a]*Department of Chemistry, Nankai University, Tianjin 300071, P. R. China*

[b]*Institute of Inorganic Chemistry, Karlsruhe Institute of Technology, Engesserstrasse 15, 76131, Karlsruhe, Germany*

Supplementary Index

Crystallographic studies

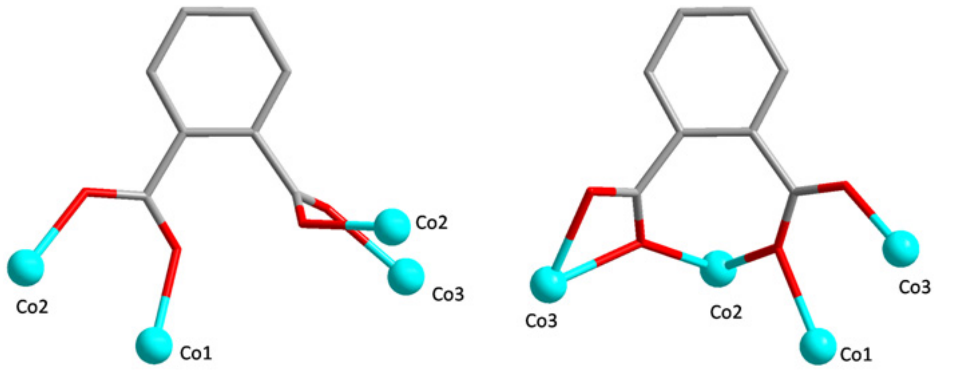
Diffraction intensity data for single crystals of **1** were collected at 113 K on a Rigaku Saturn 007 CCD diffractometer. The instruments were equipped with graphitemonochromated Mo-$K\alpha$ radiation (λ = 0.71073 Å). The structures were solved by the direct method and refined by the full-matrix least-squares method on F^2 with anisotropic thermal parameters for all non-hydrogen atoms.[1,2] Hydrogen atoms were located geometrically and refined isotropically.

[1] Sheldrick, G. M. *SHELXS 97, Program for the Solution of Crystal Structures*; University of Göttingen: Germany, **1997**.

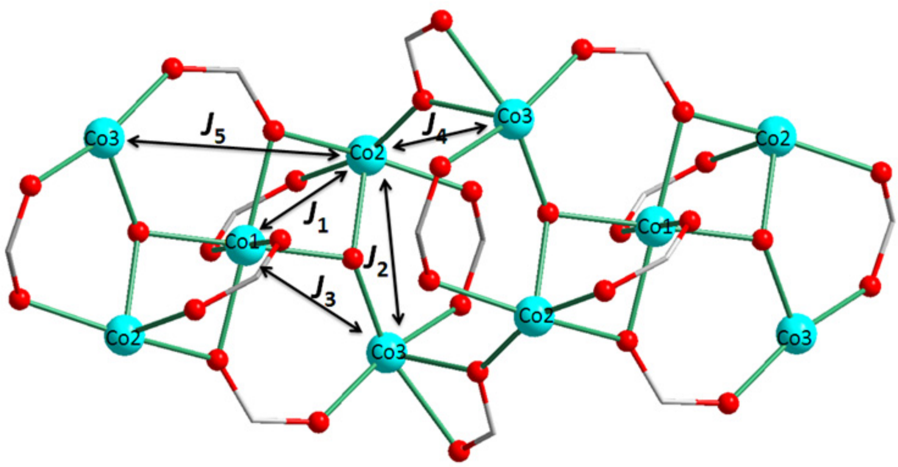
[2] Sheldrick, G. M. *SHELXL 97, Program for the Refinement of Crystal Structures*; University of Göttingen: Germany, **1997**.

Physical measurements

Analyses for C, H, and N were carried out on a Perkin-Elmer analyzer. TGA experiments were performed on a NETZSCH TG 209 instrument with a heating rate of 10 °C min^{-1}. Variable-temperature magnetic susceptibilities were measured on a Quantum Design MPMS XL-7 SQUID magnetometer. Diamagnetic corrections were made with Pascal's constants for all the constituent atoms. Heat-capacity data were measured on a Quantum Design PPMS-9 physical property measurement system. Both the magnetic data and heat-capacity data are corrected with the contribution of sample holder.



Scheme S1. Two coordination modes of the ipa^{2-} anions: μ_2-η^1:η^1 (left) and μ_2-η^2:η^1 and μ_3-η^2:η^1 (right)



Scheme S2. The pathway of magnetic interactions among the Co^{II} ions.

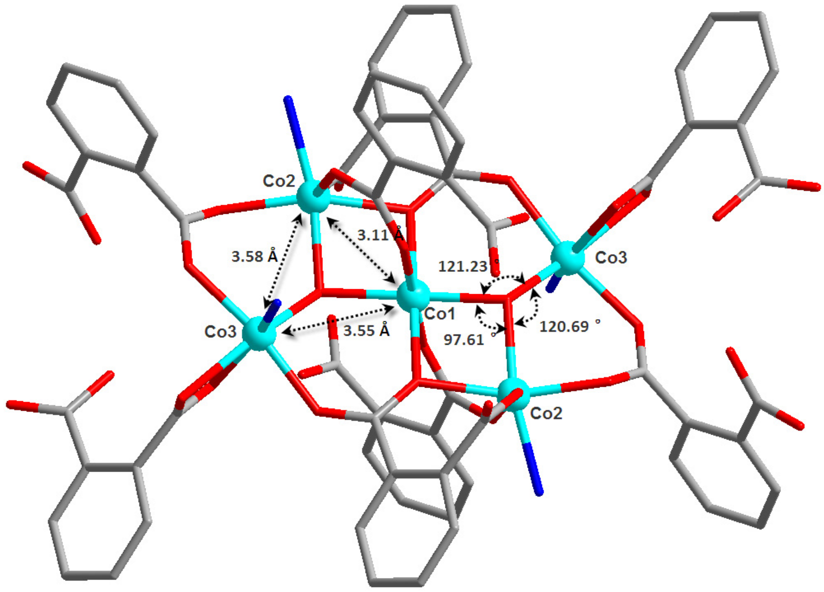


Figure S1. The [Co_5] moiety bulit by vertex-sharing of the Co^{II} trimers.

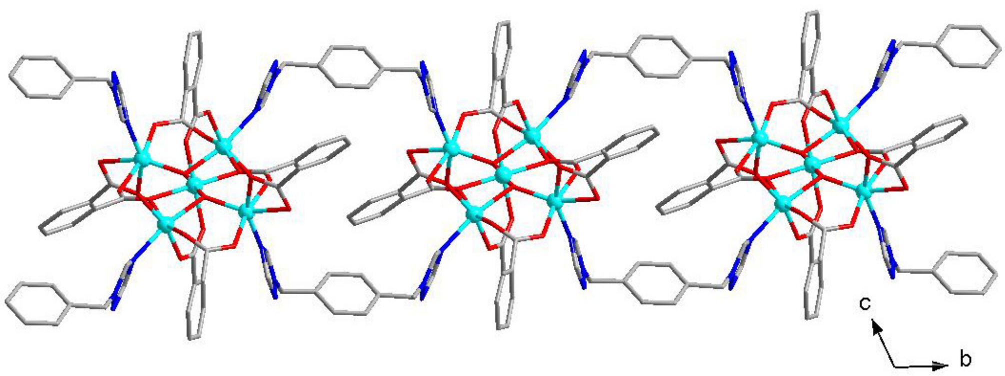


Figure S2. Perspective of the [Co_5]-based 1D chains linked by btx with *cis*-configuration viewed down the *a* axis.

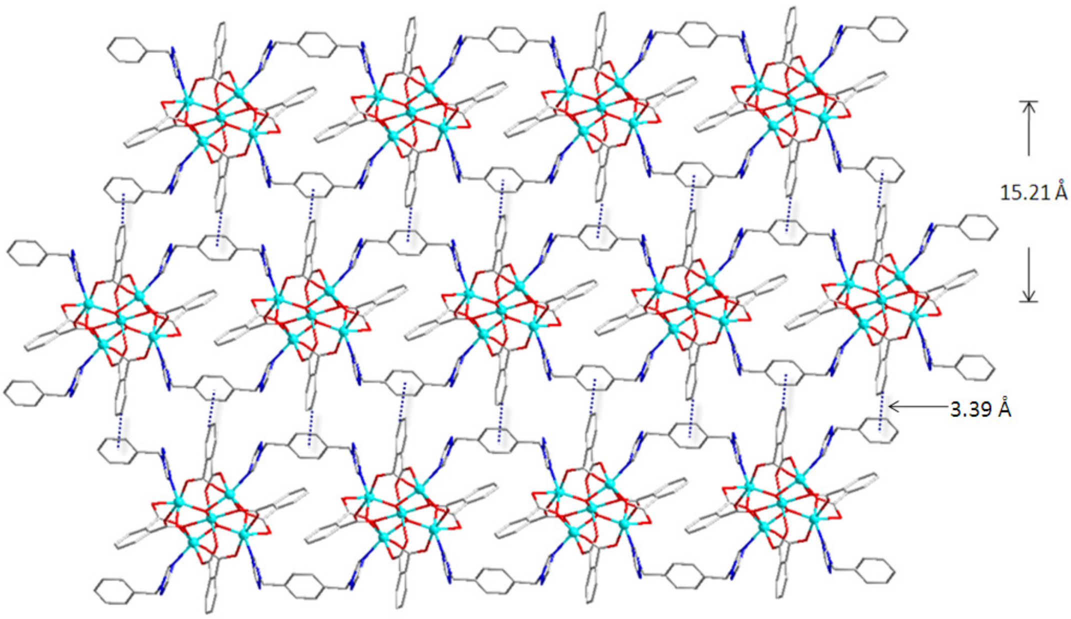


Figure S3. Edge-to-face π···π interactions of the layers viewed down the *a* axis.

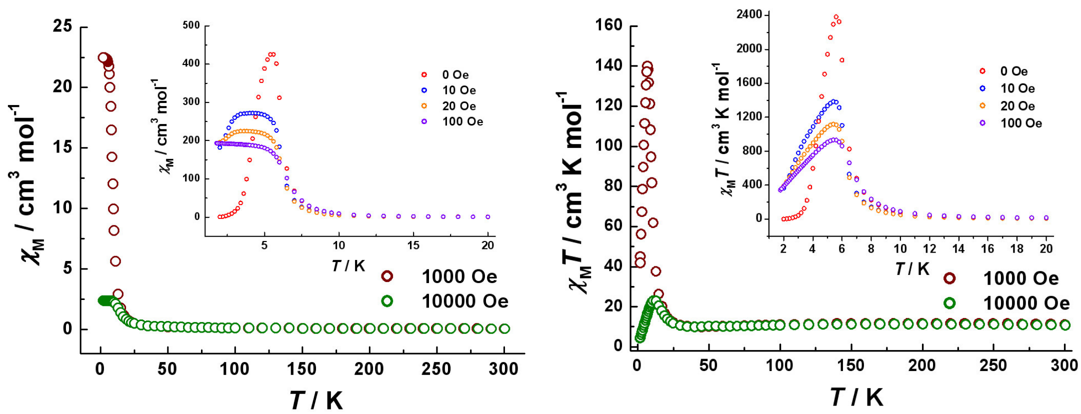


Figure S4. Plots of χ_M vs T (left) and $\chi_M T$ vs T (right) at an applied field of 0, 20, 40, 100, 1000 and 10000 Oe, respectively. The 0 Oe data were measured at 1 Hz frequency, 3 Oe oscillating field and zero external field.

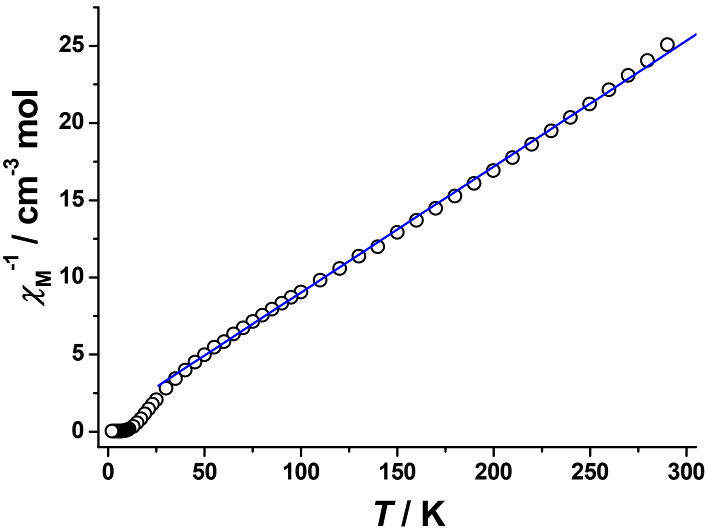


Figure S5. Plots of χ_M^{-1} vs T fitted by Curie-Weiss law in the temperature range of 50-300 K with the data obtained at 1000 Oe.

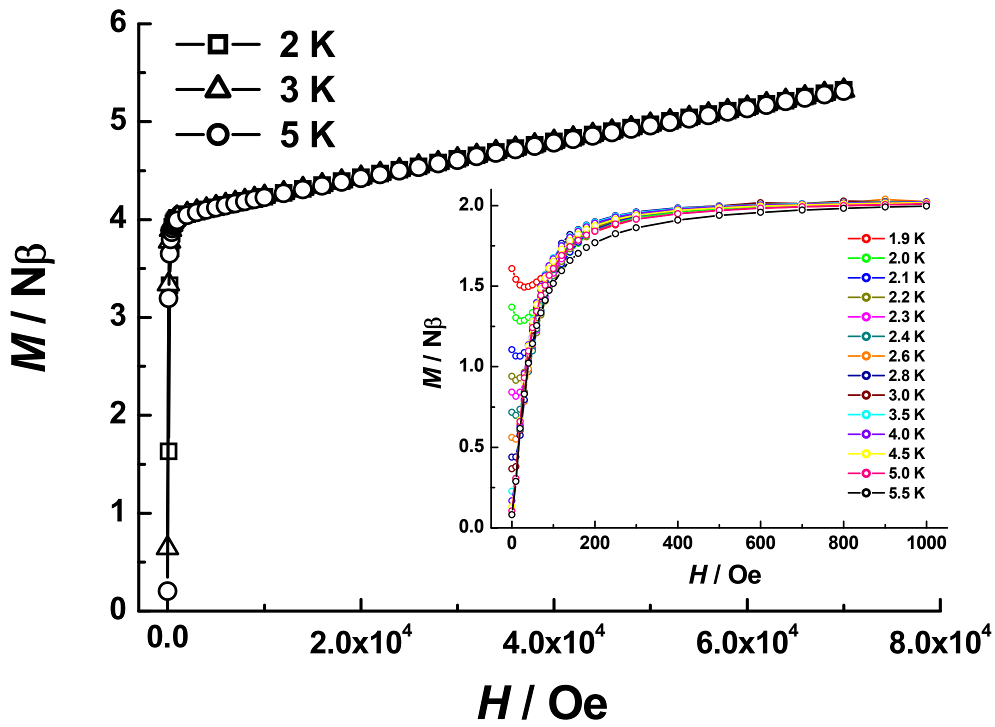


Figure S6. Magnetization curves at different temperatuer.

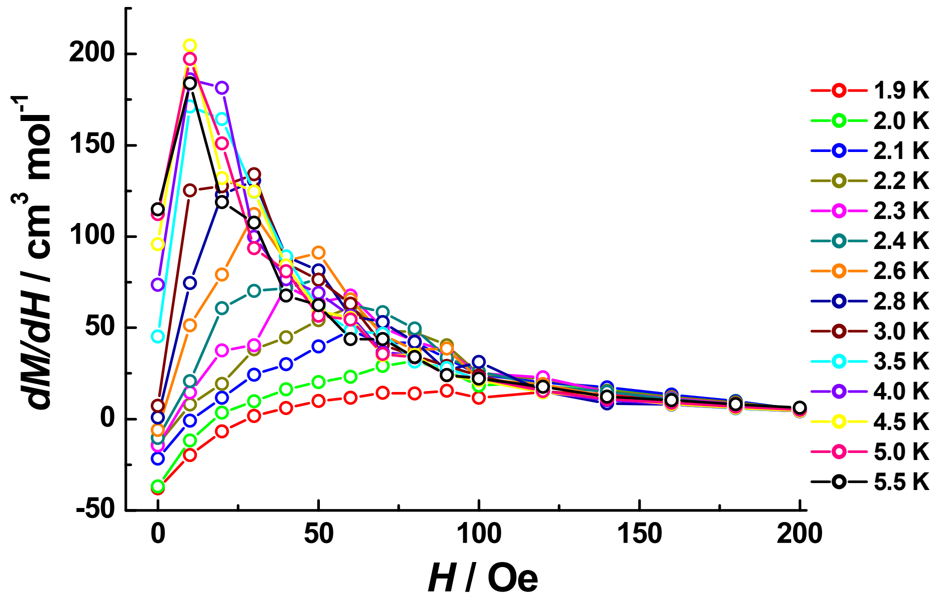


Figure S7. First field derivative of the magnetization as a function of the applied dc-field for **1** at different temperature. The plots were obtained from the data of Figure S6. Solid lines are guides for eyes.

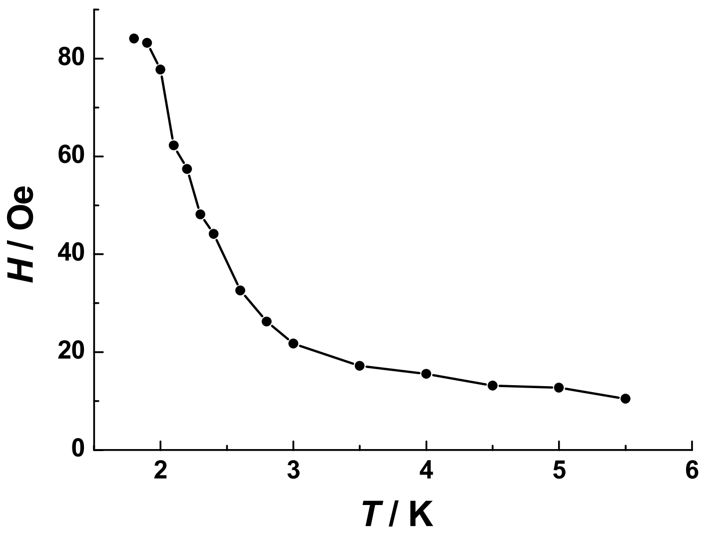


Figure S8. (T, H) phase diagram of **1**. The plots were obtained from the maximum of susceptibility from Figure S7. Solid lines are guides for eyes.

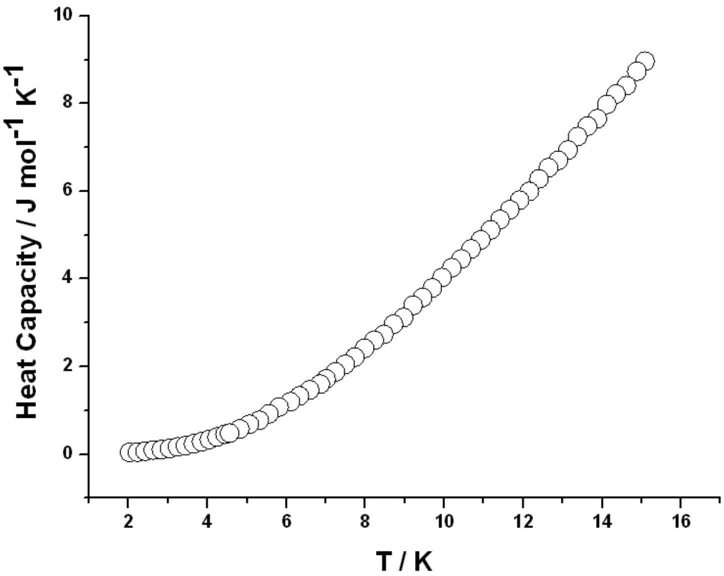
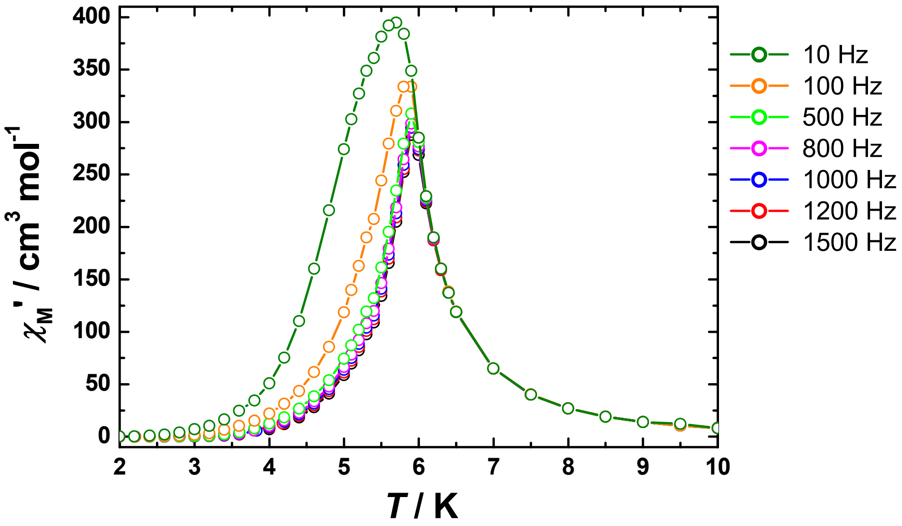


Figure S9. The heat-capacity plots of **1** in the temperature range of 2-15 K.



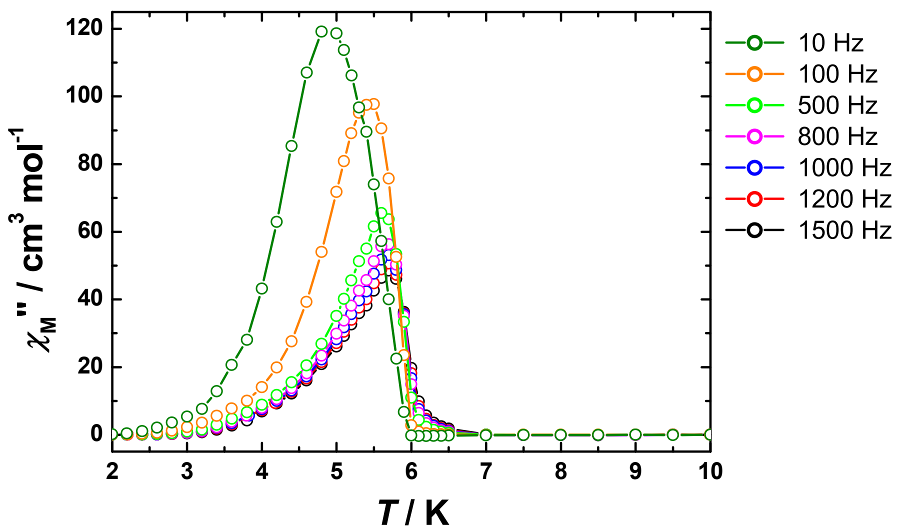


Figure S10. Temperature dependence of the χ' (top) and χ'' (bottom) components of the ac magnetic susceptibilities of **1** measured in an oscillating field of 3 Oe at various frequencies.

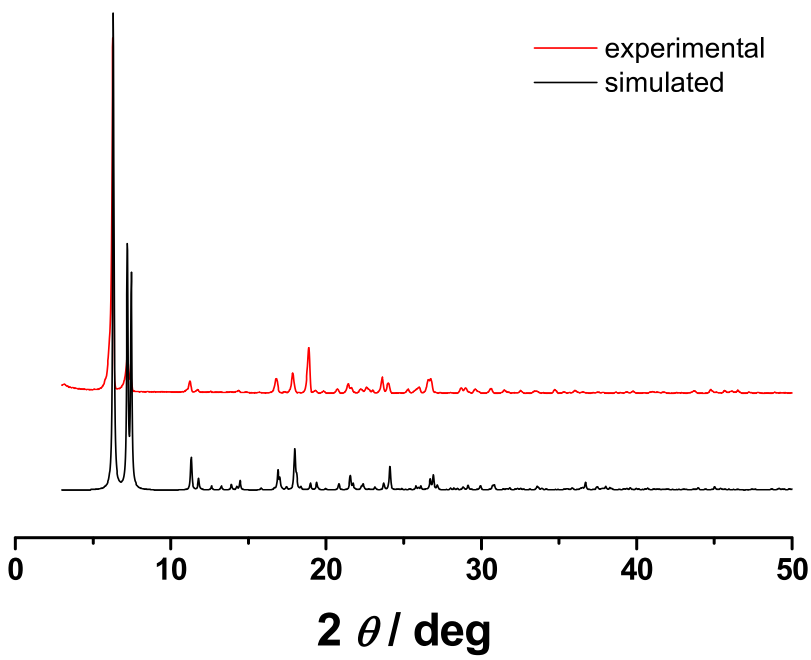


Figure S11. X-Ray powder diffraction patterns of **1**.

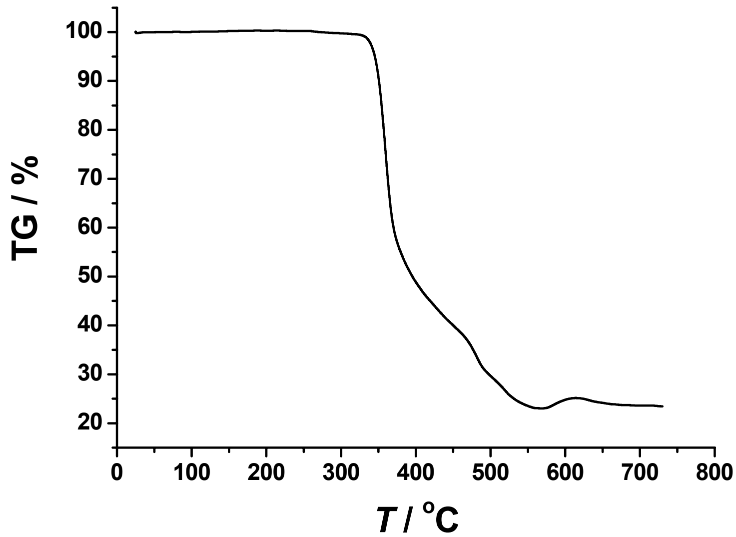


Figure S12. TGA curve of **1**. The sample was heated to 730 ℃ at the heating rate of 10 ℃/min.