

Supporting Information

Crystal Growth, Structures and Magnetic Properties of Copper Hydroxide Compounds with Distorted Diamond Chain Magnetic Networks

Wataru Fujita,^{a*} Akio Tokumitsu,^a Yutaka Fujii,^b Hikomitu Kikuchi^b

^aDepartment of Informatics and Biological Sciences, Nagoya City University, 1 Yamanohata, Mizuho-cho, Mizuho-ku, Nagoya 467-8501, Japan.

^bDepartment of Applied Physics, University of Fukui. Bunkyo 3-9-1, Fukui 910-8507, Japan.

E-mail: fujitaw@nsc.nagoya-cu.ac.jp

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1. Crystal Structures

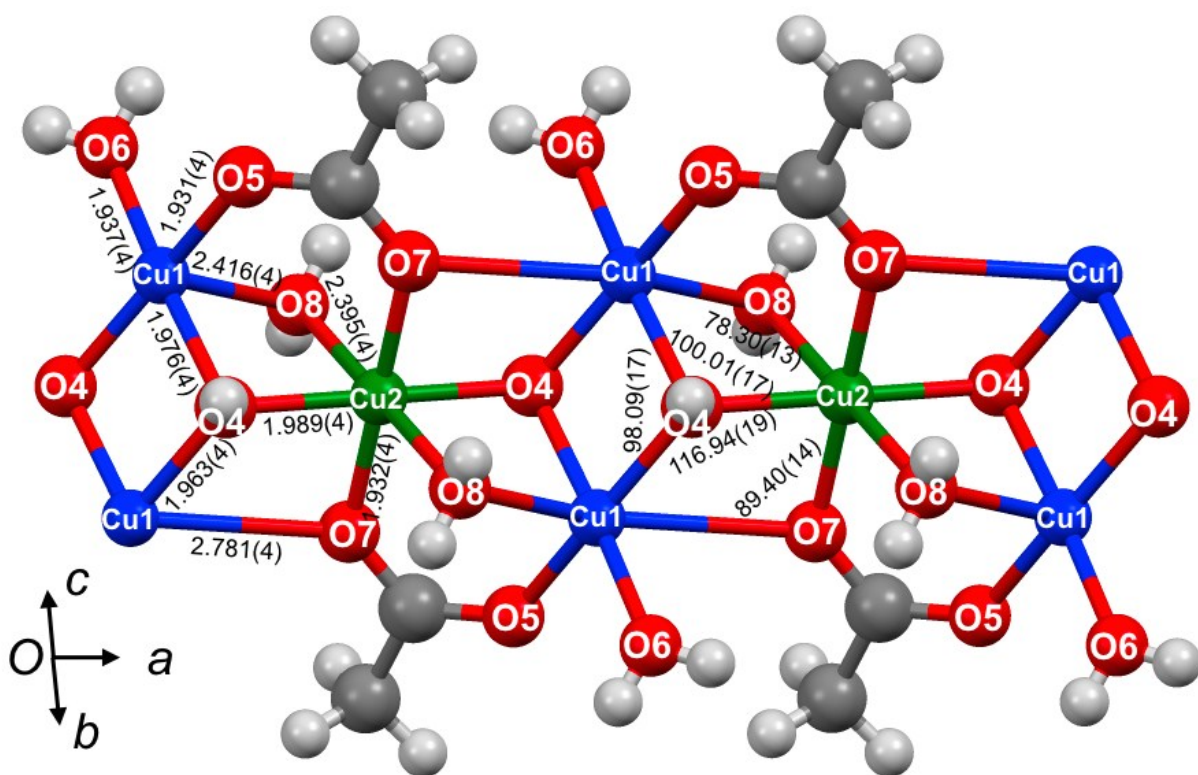


Figure S1. Selected Cu-O bond lengths and Cu-O-Cu bridging angles in the diamond chain unit in **1**.

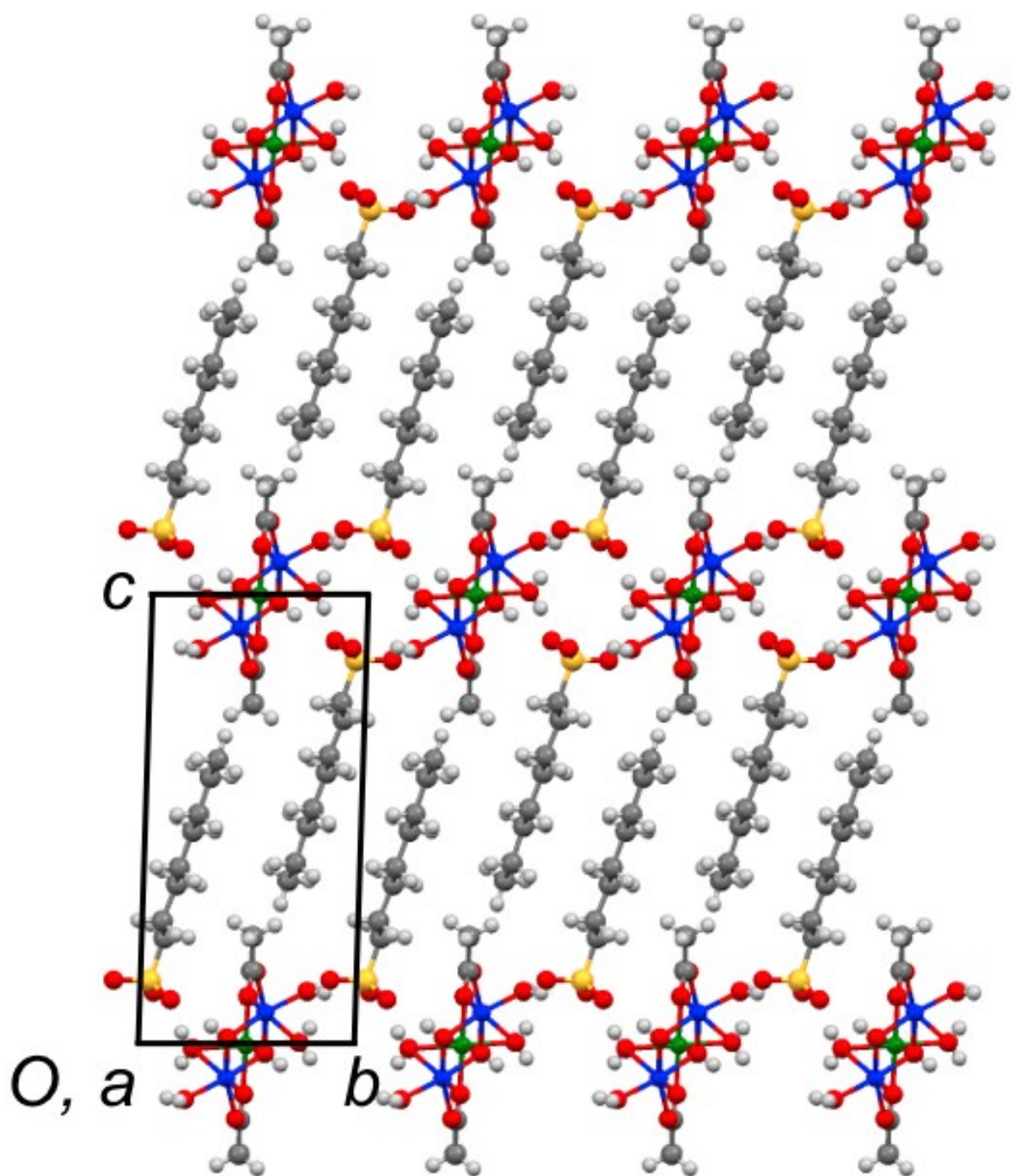


Figure S2. Crystal structure of **2** along the *a* axis. The spheres correspond to Cu (blue, green), O (red), C (dark grey), S (yellow), and H (light grey) atoms.

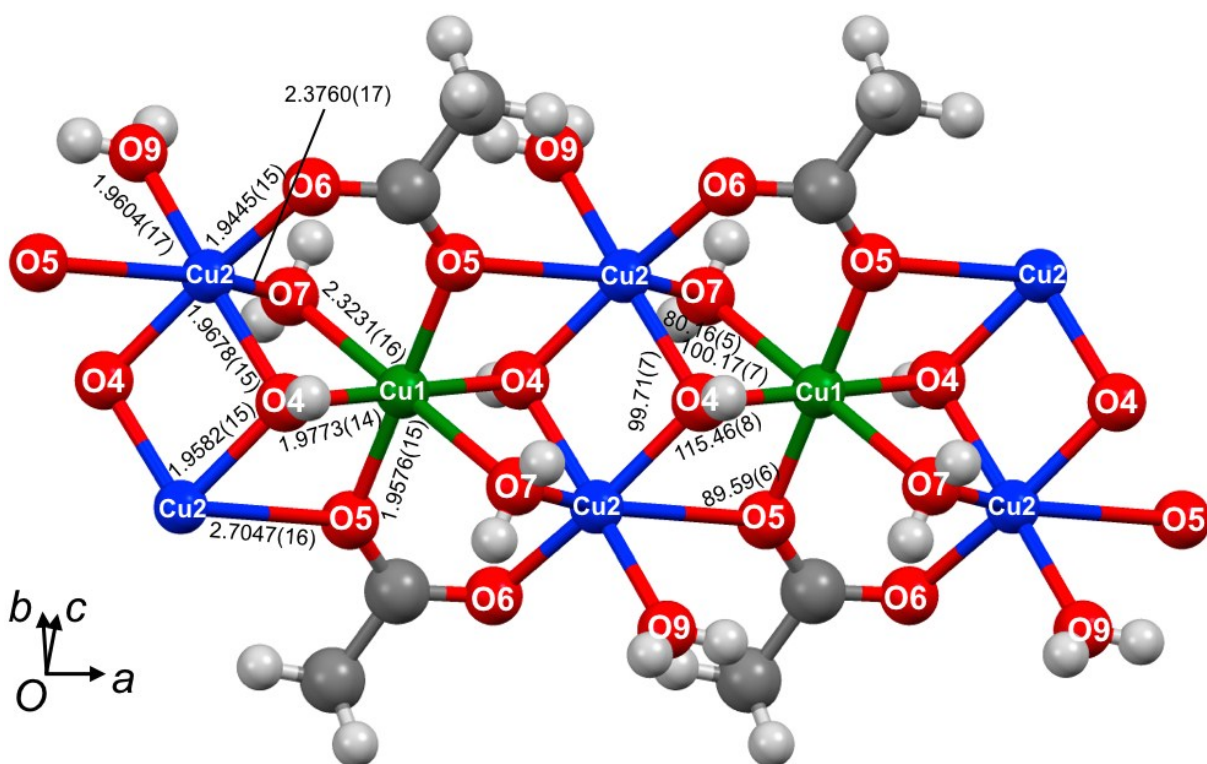


Figure S3. Selected Cu-O bond lengths and Cu-O-Cu bridging angles in the diamond chain unit in **2**.

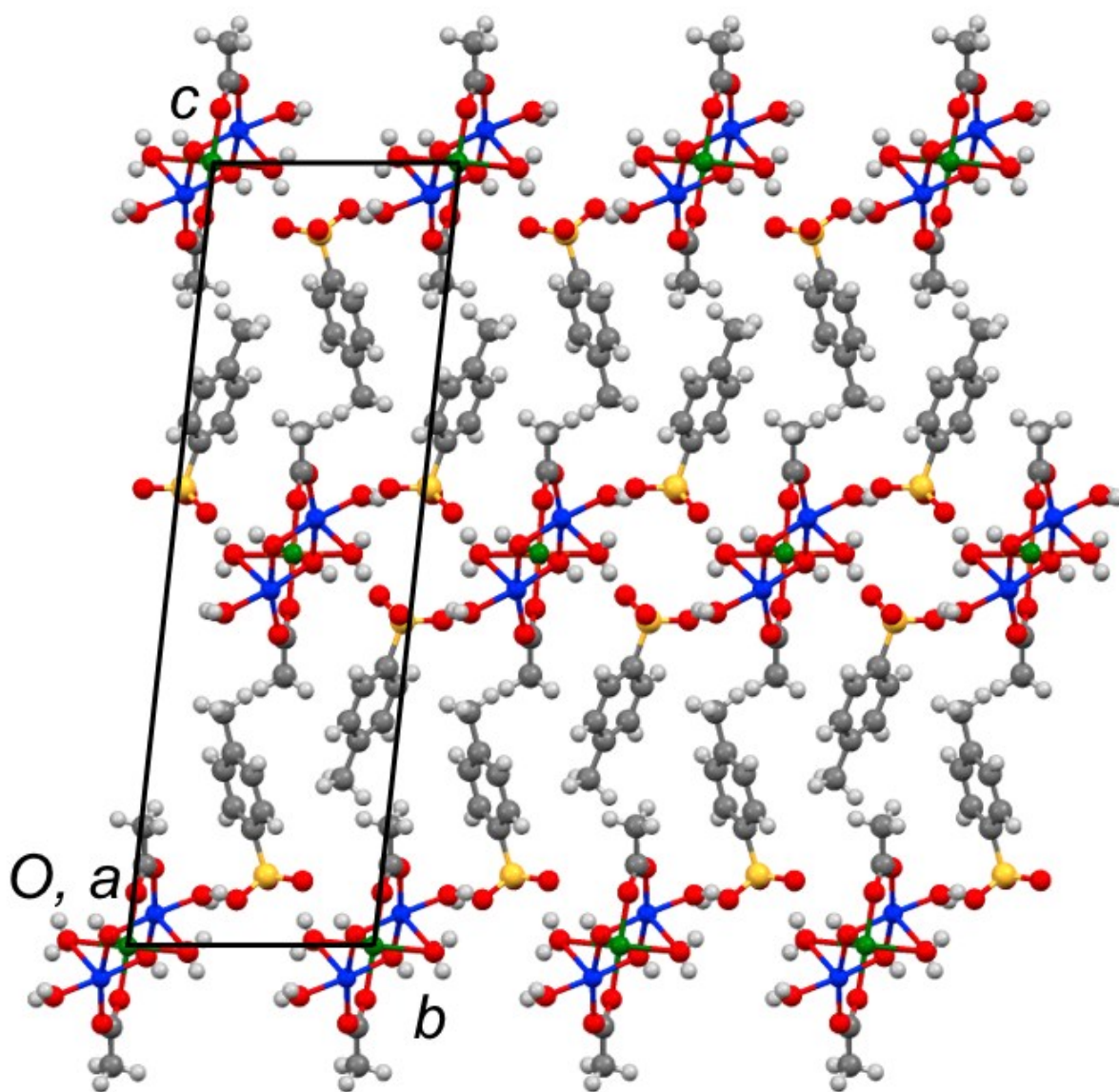


Figure S4. Crystal structure of **3** along the a axis. The spheres correspond to Cu (blue, green), O (red), C (dark grey), S (yellow), and H (light grey) atoms.

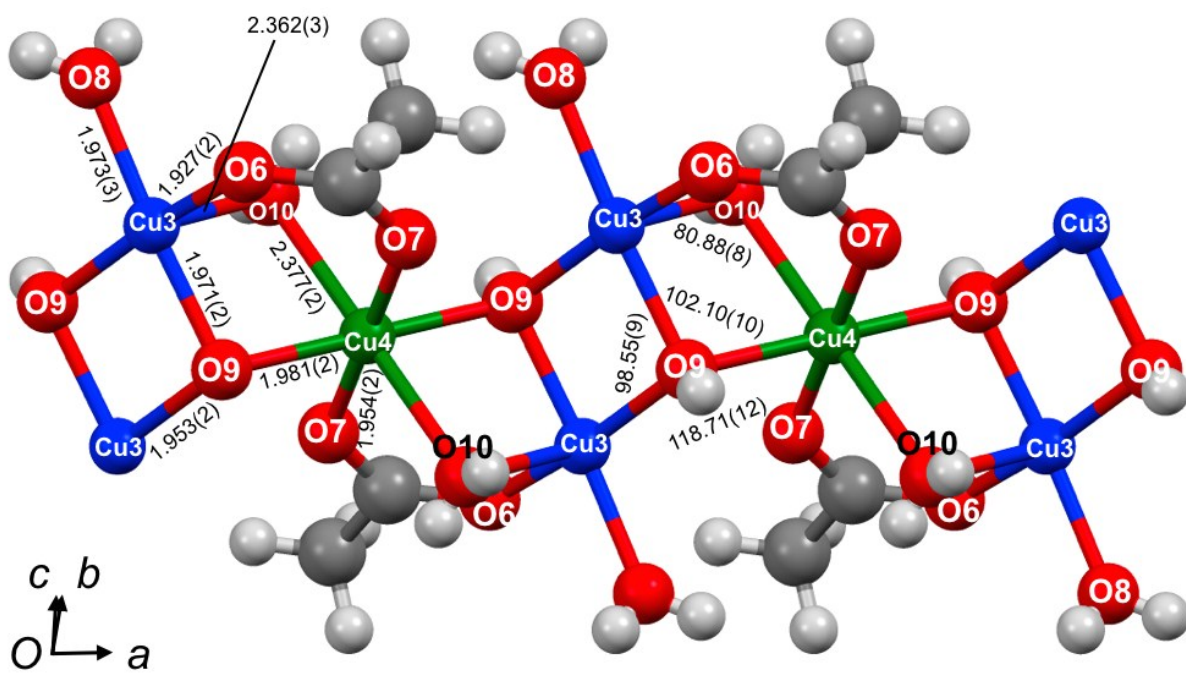
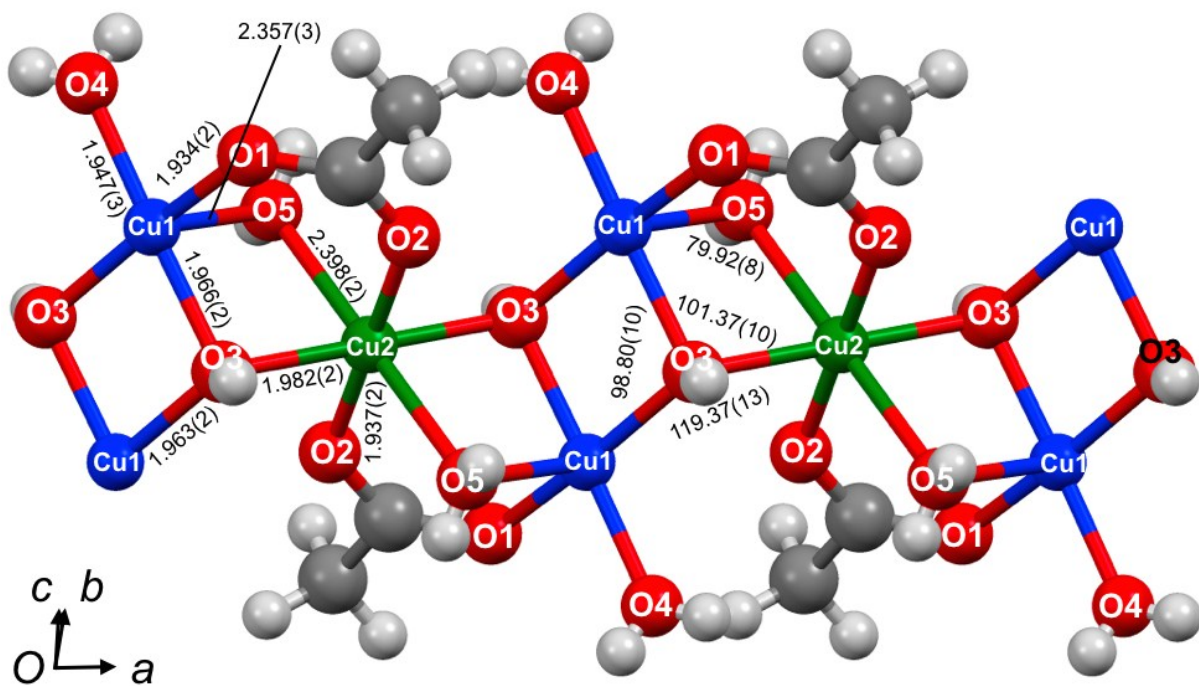


Figure S5. Selected Cu-O bond lengths and Cu-O-Cu bridging angles in the diamond chain units in **3**. Compound **3** has two kinds of diamond chain units.

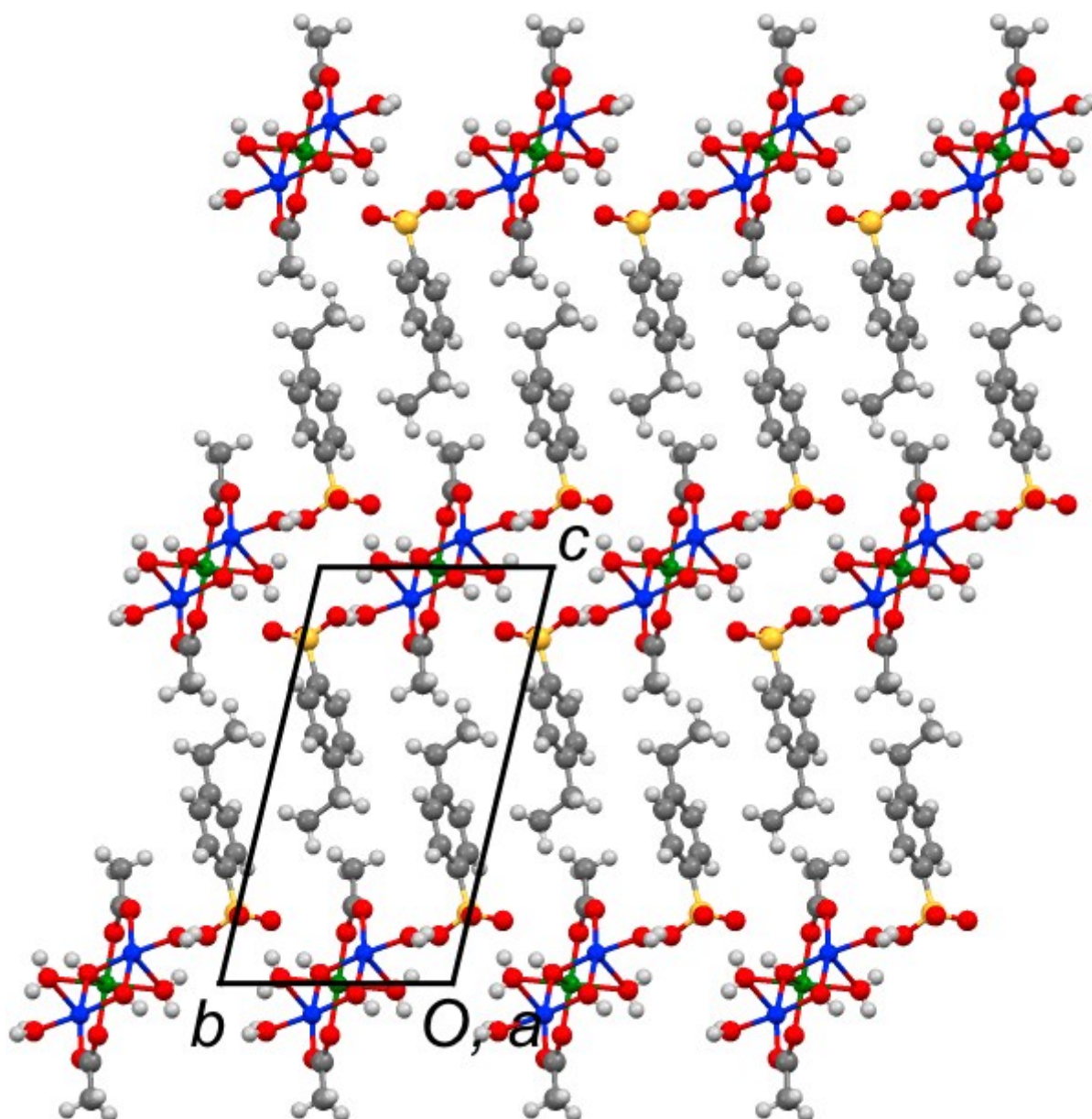


Figure S6. Crystal structure of **4** along the a axis. The spheres correspond to Cu (blue, green), O (red), C (dark grey), S (yellow), and H (light grey) atoms.

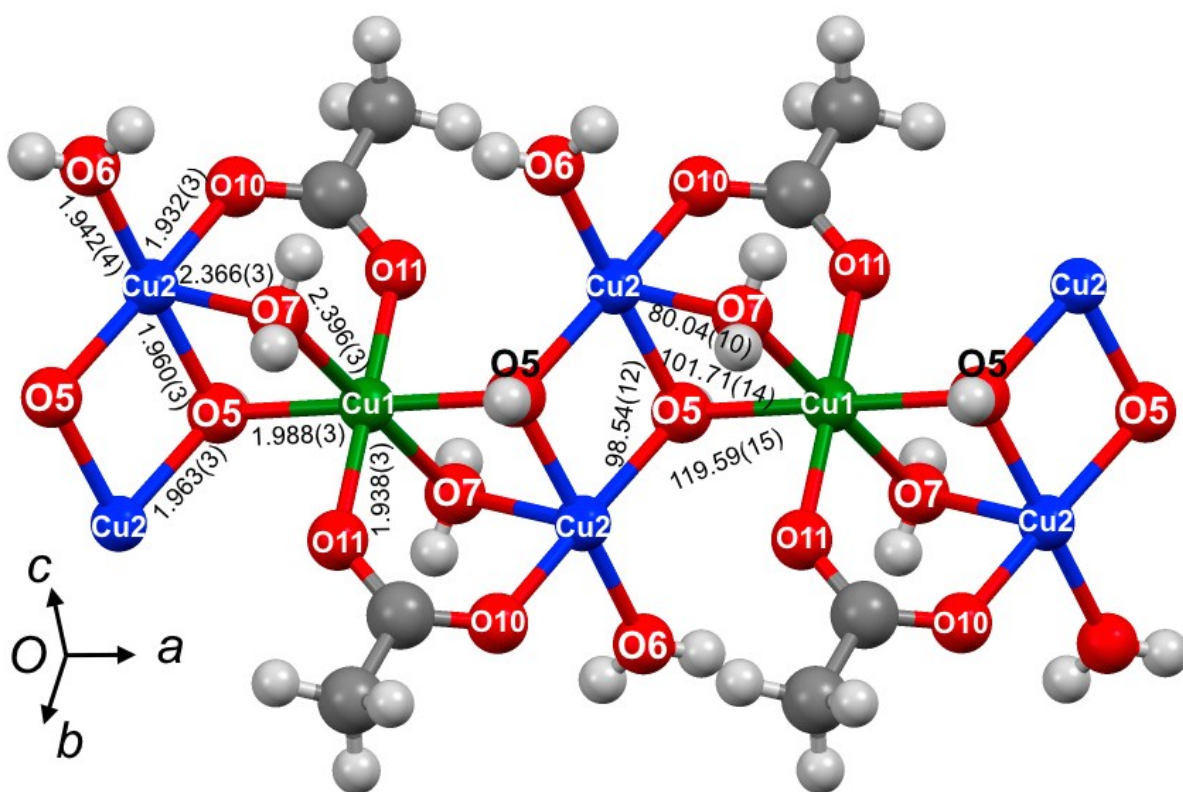


Figure S7. Selected Cu-O bond lengths and Cu-O-Cu bridging angles in the diamond chain unit in **4**.

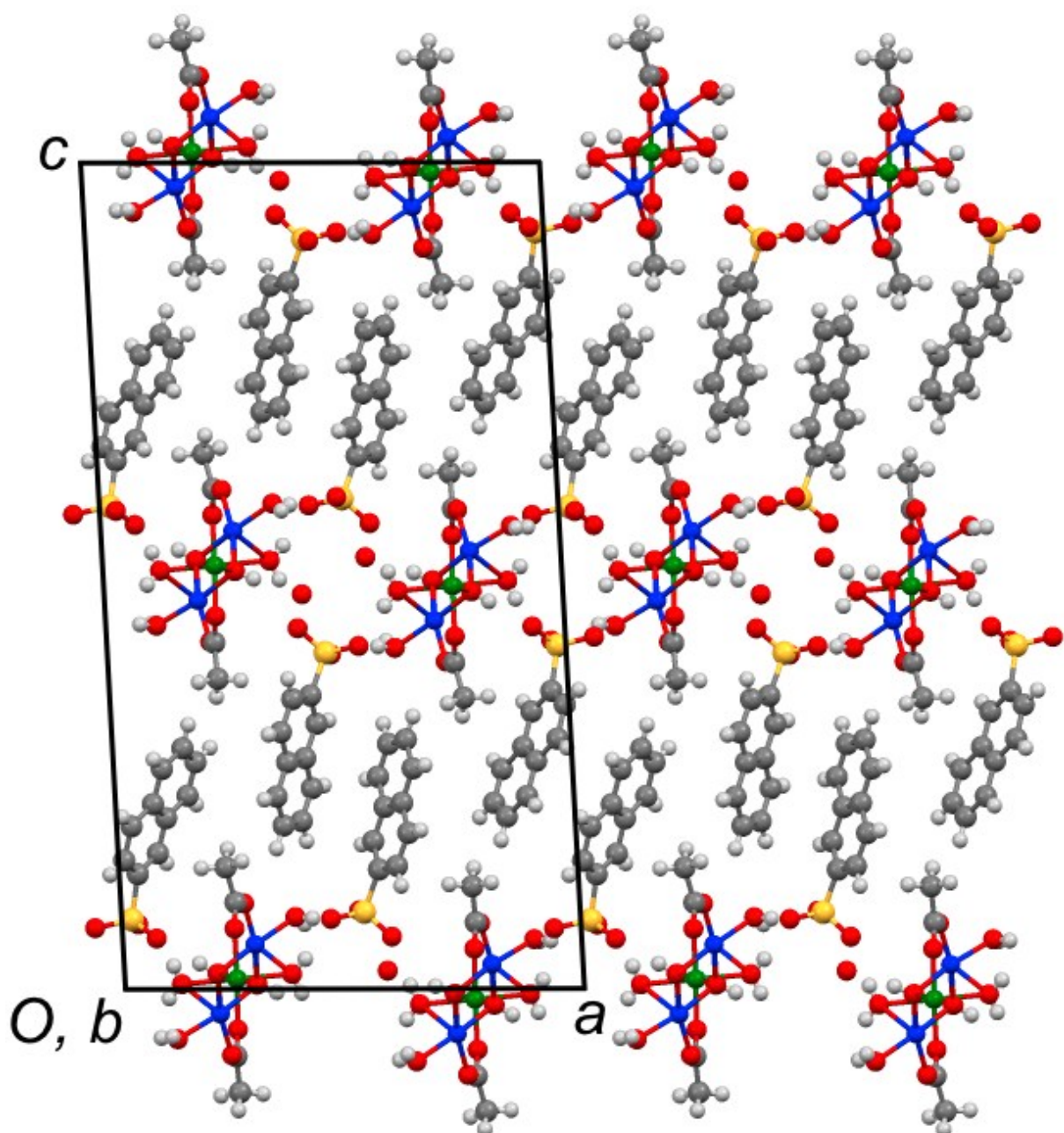


Figure S8. Crystal structure of **5** along the *b* axis. The spheres correspond to Cu (blue, green), O (red), C (dark grey), S (yellow), and H (light grey) atoms.

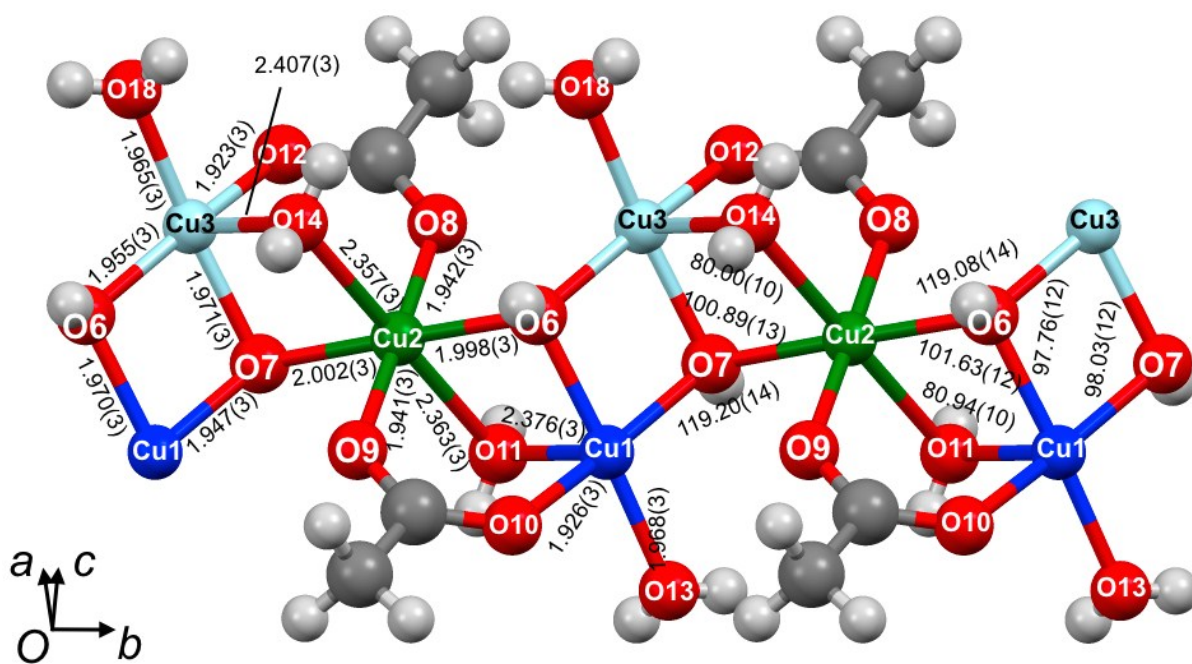


Figure S9. Selected Cu-O bond lengths and Cu-O-Cu bridging angles in the diamond chain unit in **5**.

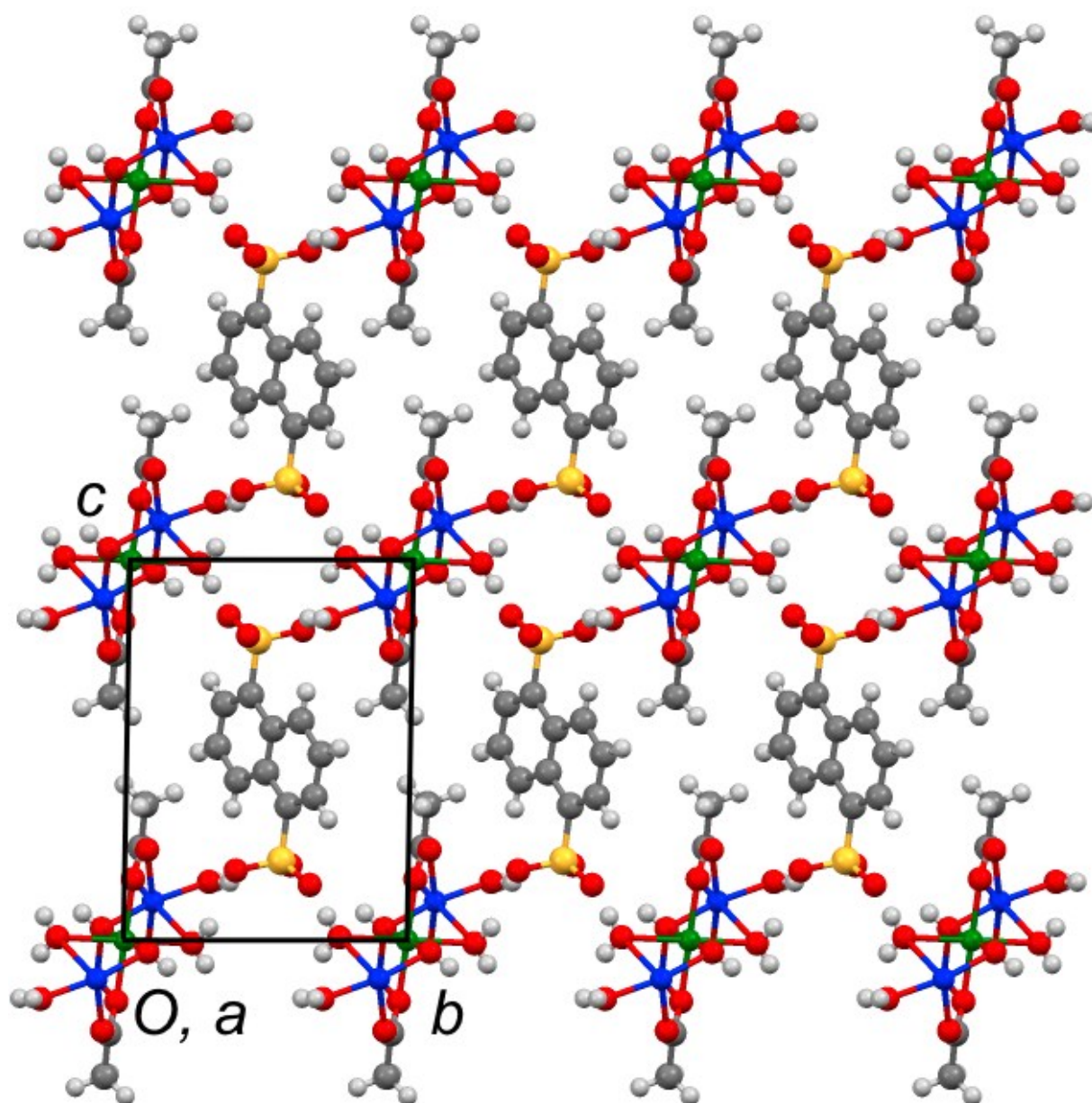


Figure S10. Crystal structure of **6** along the *a* axis. The spheres correspond to Cu (blue, green), O (red), C (dark grey), S (yellow), and H (light grey) atoms.

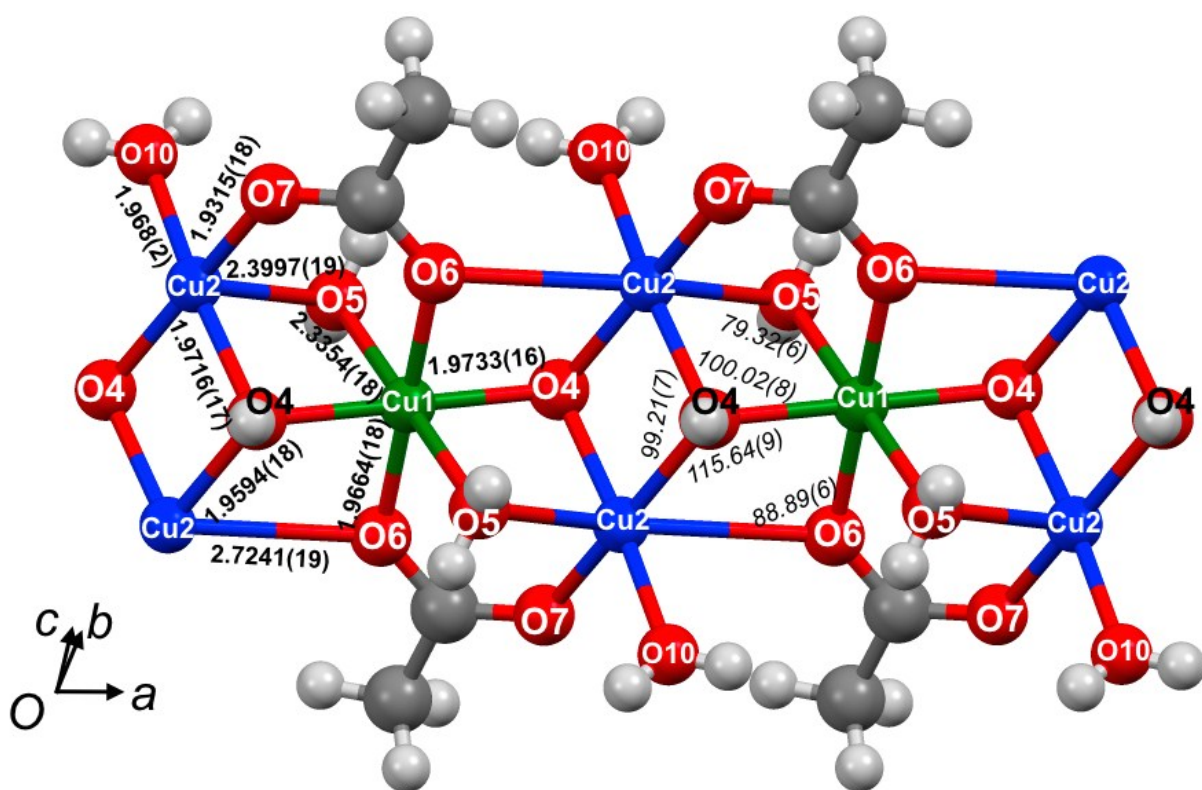


Figure S11. Selected Cu-O bond lengths and Cu-O-Cu bridging angles in the diamond chain unit in 6.

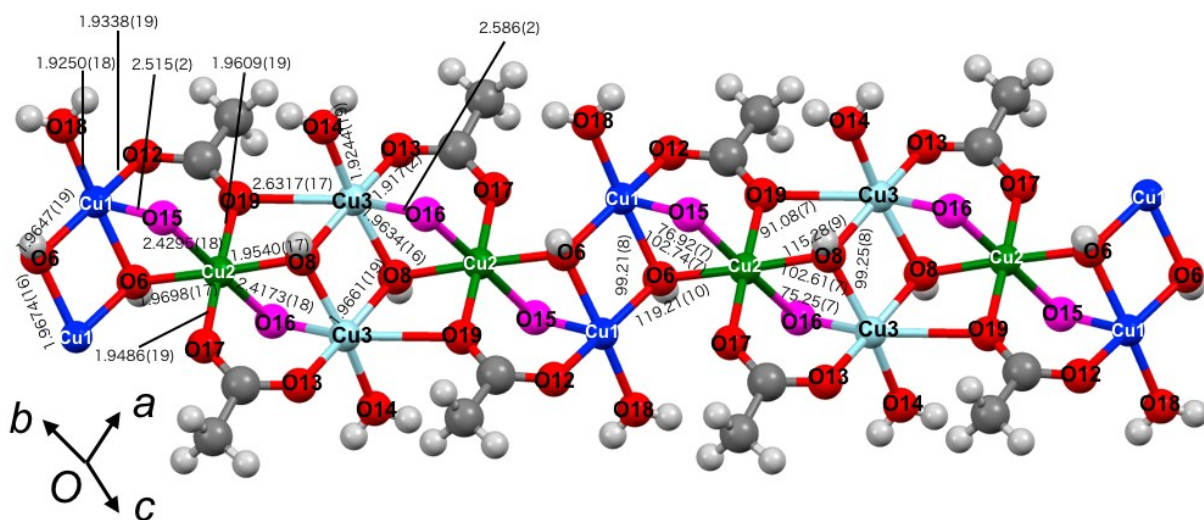


Figure S12. Selected Cu-O bond lengths and Cu-O-Cu bridging angles in the diamond chain unit in 7.

2. Field Dependence of Magnetization for 1-7

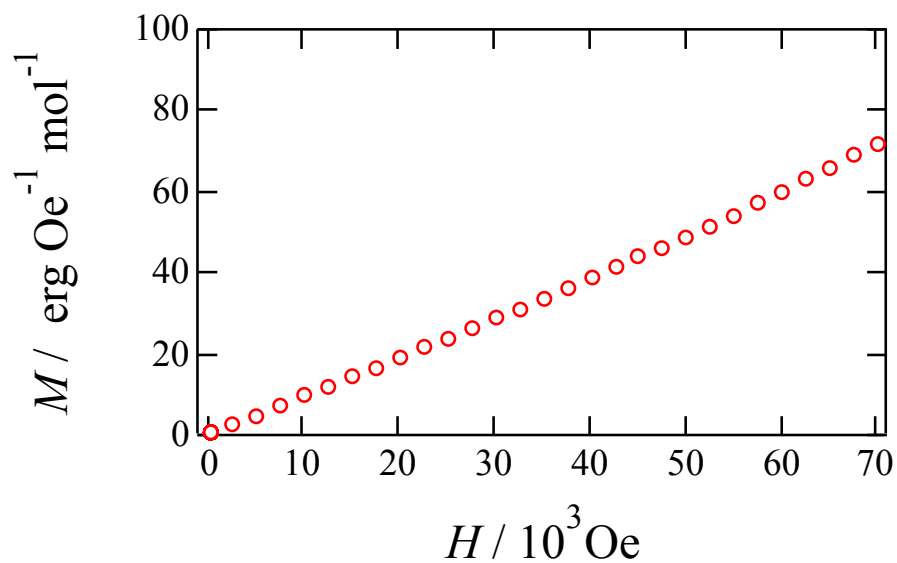


Figure S13. Field dependence of magnetization at 2 K in **1**.

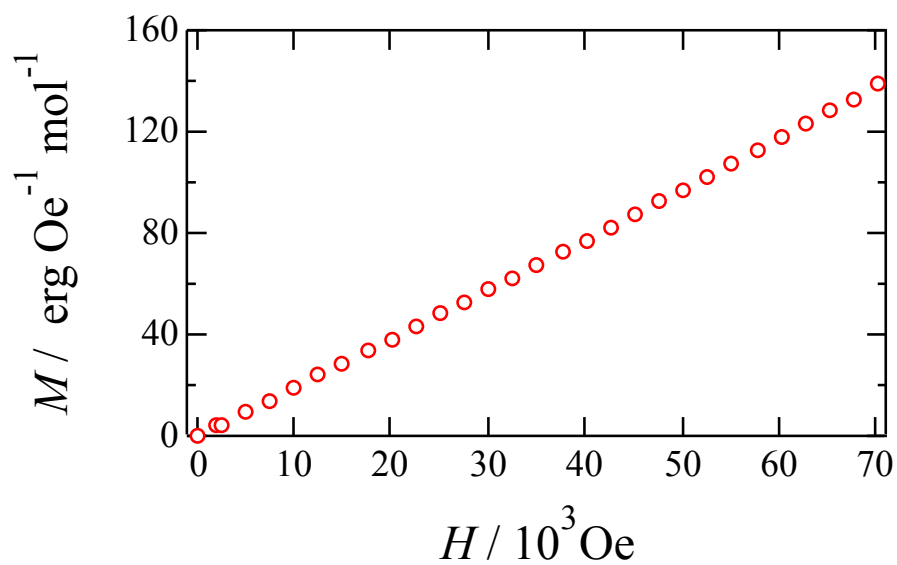


Figure S14. Field dependence of magnetization at 2 K in **2**.

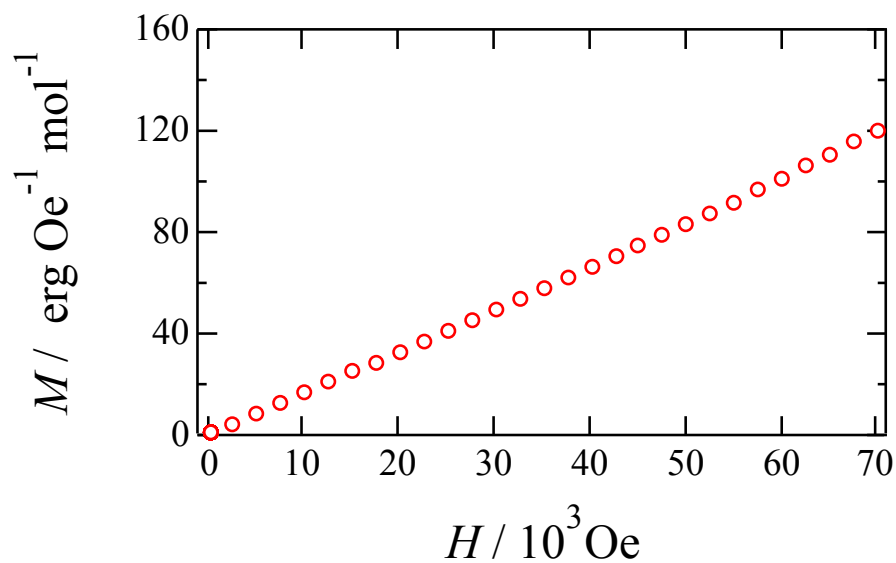


Figure S15. Field dependence of magnetization at 2 K in **3**.

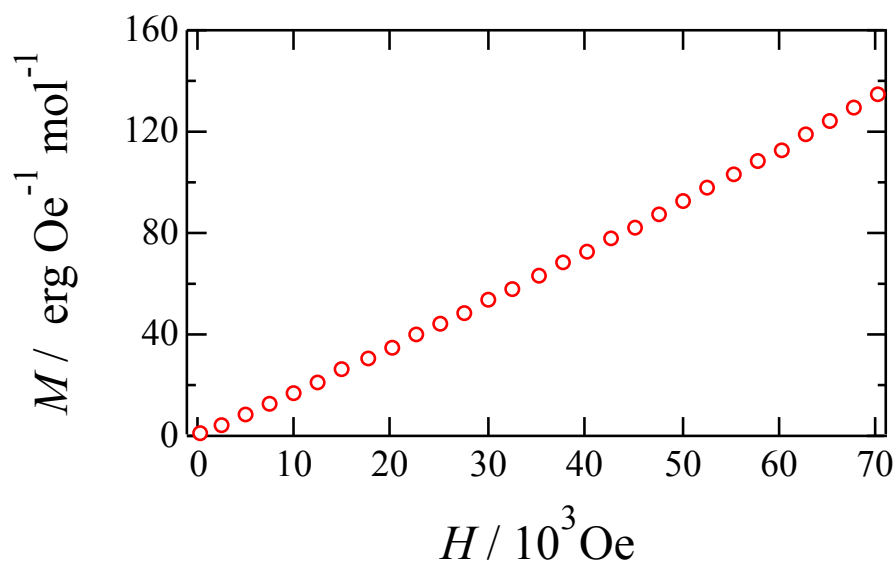


Figure S16. Field dependence of magnetization at 2 K in **4**.

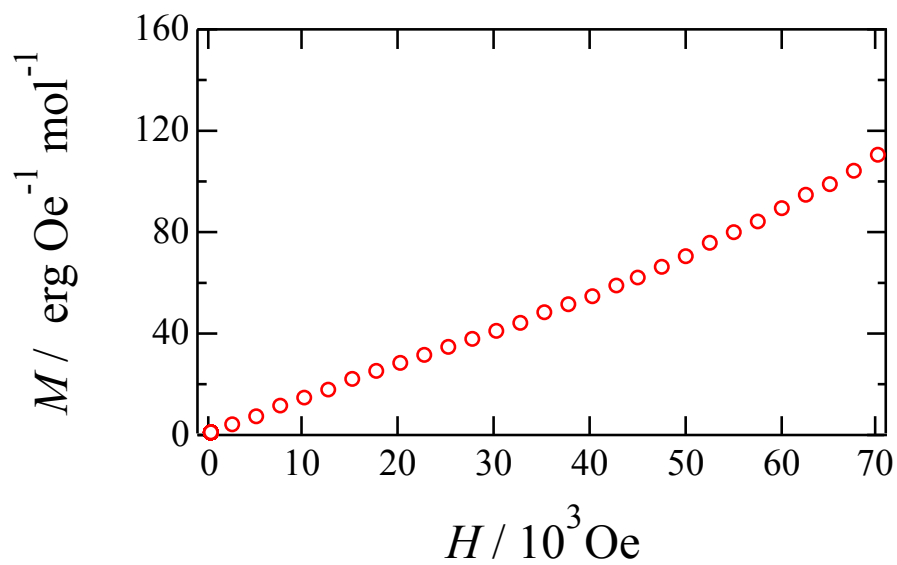


Figure S17. Field dependence of magnetization at 2 K in 5.

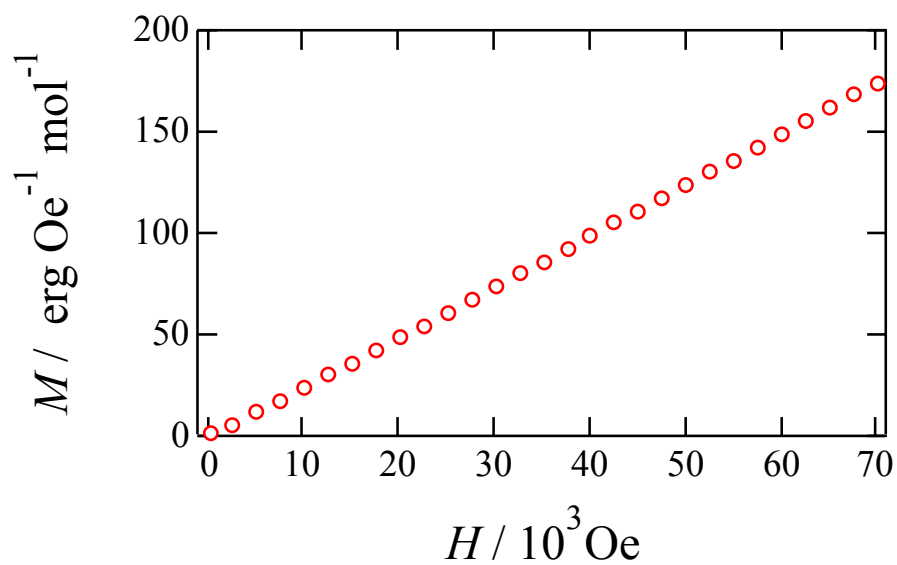


Figure S18. Field dependence of magnetization at 2 K in 6.

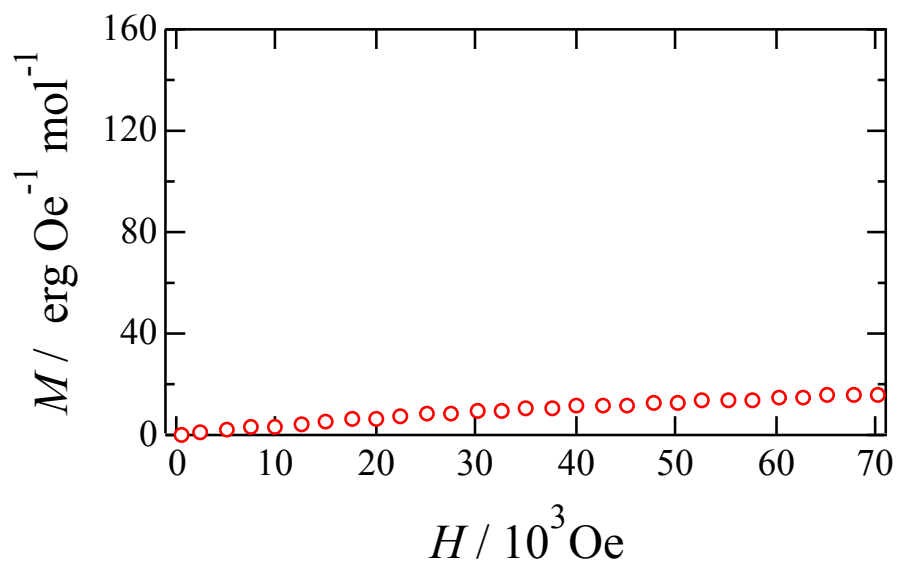
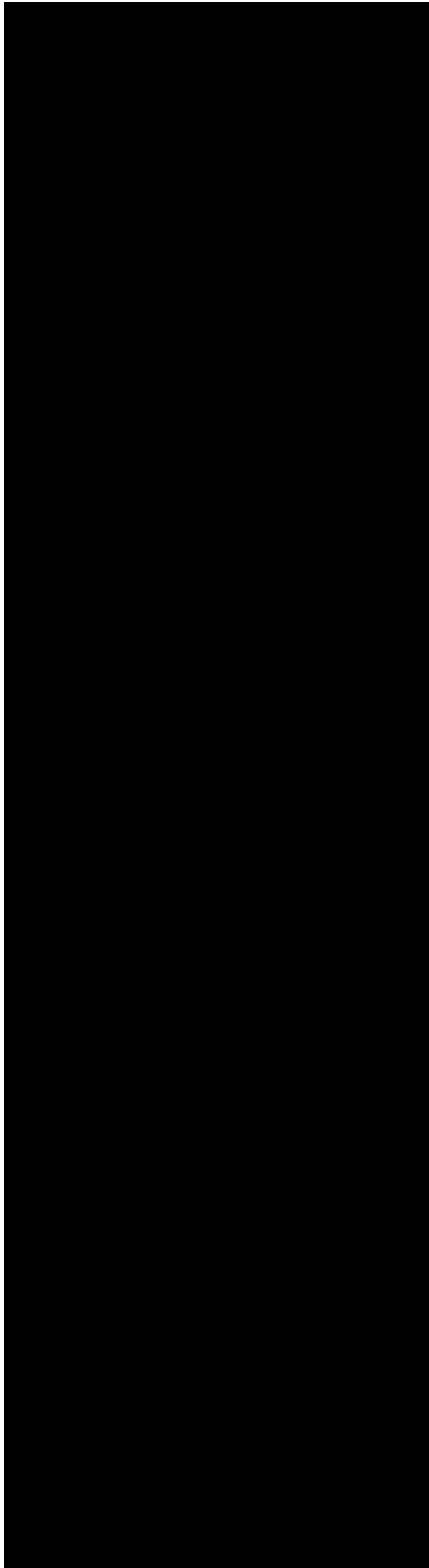


Figure S19. Field dependence of magnetization at 2 K in 7.



References

- [1] H. Kikuchi, Y. Fujii, M. Chiba, S. Mitsudo, T. Idehara, T. Tonegawa, K. Okamoto, T. Sakai, T. Kuwai and H. Ohta, *Phys. Rev. Lett.* 2005, **94**, 227201.
- [2] S. Yoneyama, K. Kodama, K. Kikuchi, Y. Fujii, H. Kikuchi and W. Fujita, *CrystEngComm* 2014, **16**, 10385.