Influence of structure and doping on frustration in low-dimensional coordination polymers

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This document contains additional information concerning the research work carried out and presented in the thesis, submitted for the degree of *Doctor of Philosophy*.

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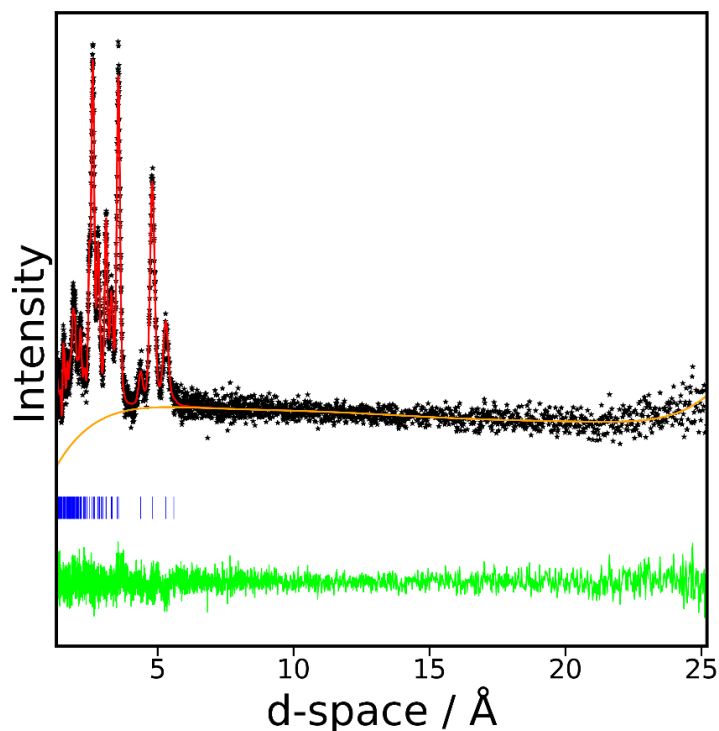# Neutron diffraction patterns and Rietveld refinements for Tb(DCO$_2$)(C$_2$O$_4$)

Figure S1: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at room temperature using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.60 % and 4.09 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
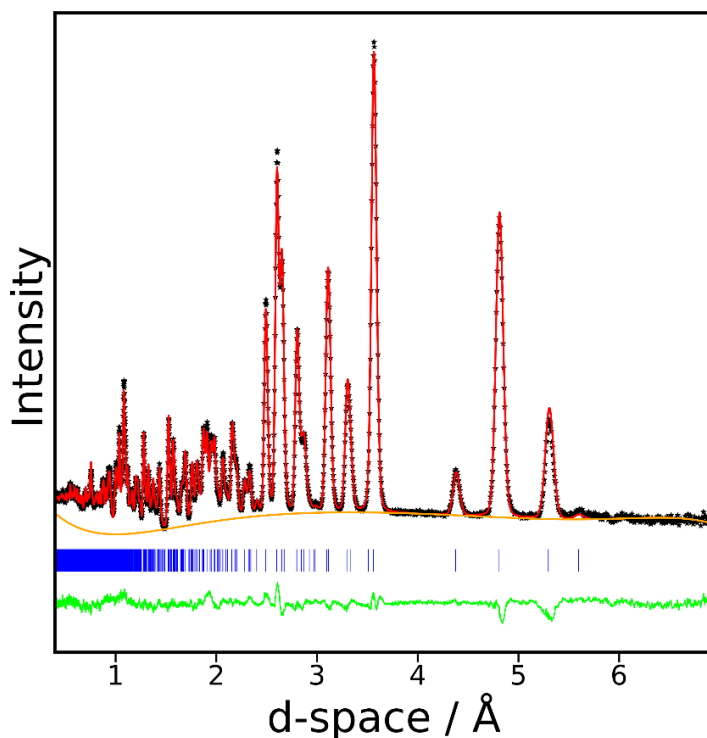

Figure S2: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at room temperature using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.24 % and 2.68 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
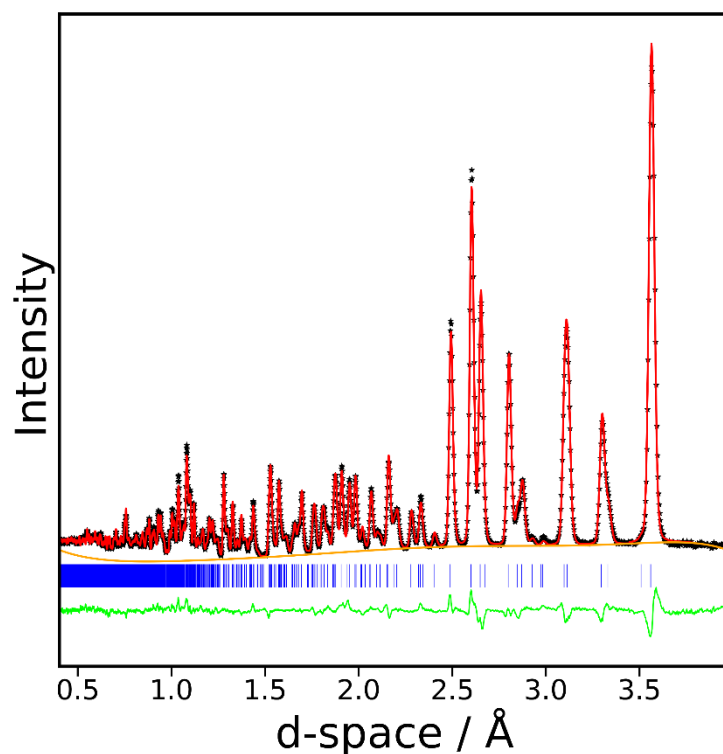
Figure S3: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at room temperature using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.93 % and 3.27 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
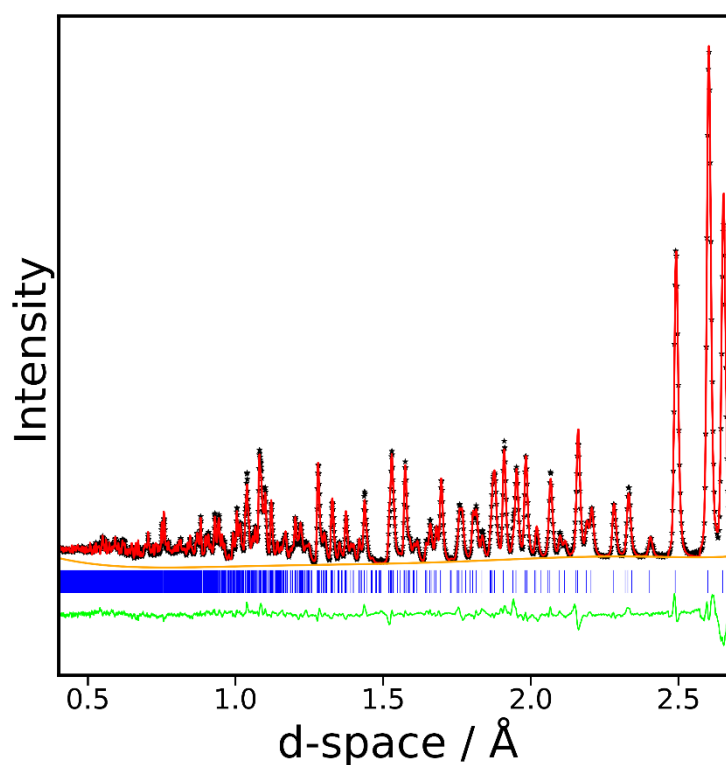

Figure S4: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at room temperature using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.13 % and 3.55 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
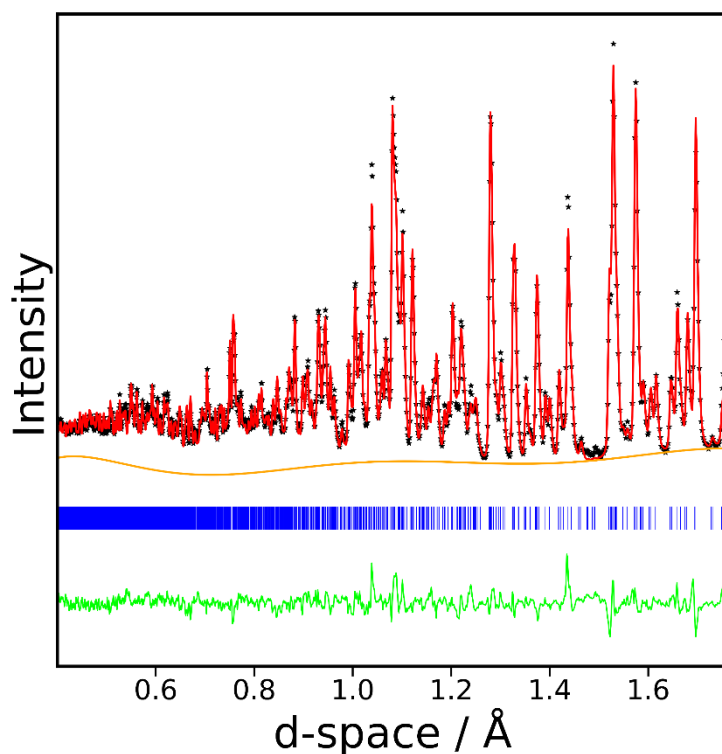
Figure S5: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at room temperature using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.67 % and 3.28 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
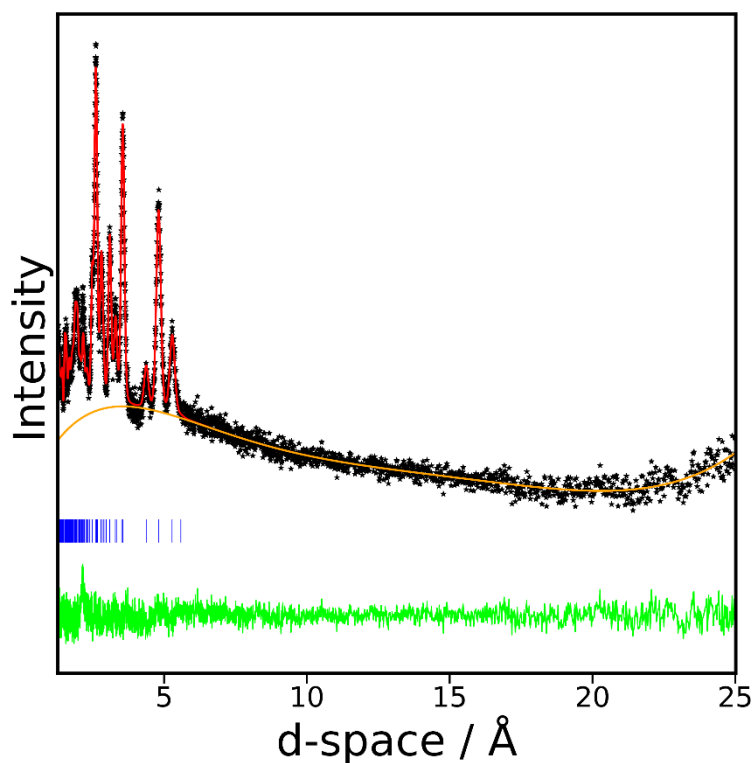

Figure S6: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at 20 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.56 % and 1.88 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
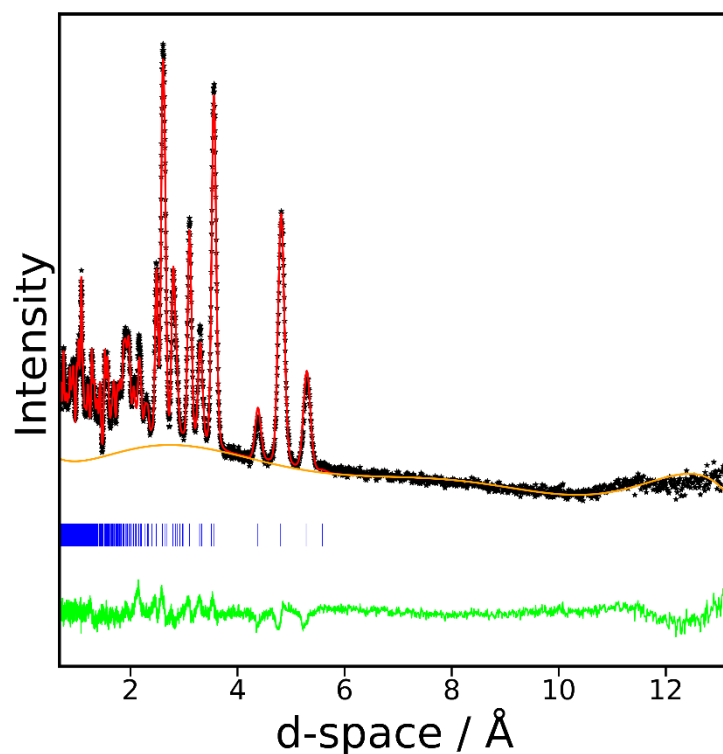
Figure S7: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 20 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 1.65 % and 1.90 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
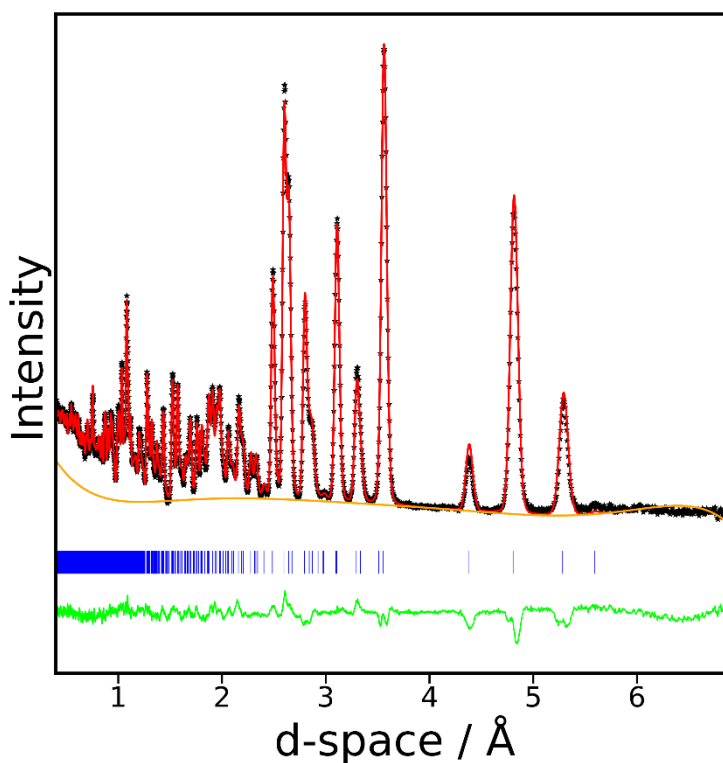

Figure S8: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 20 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 2.10 % and 2.21 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
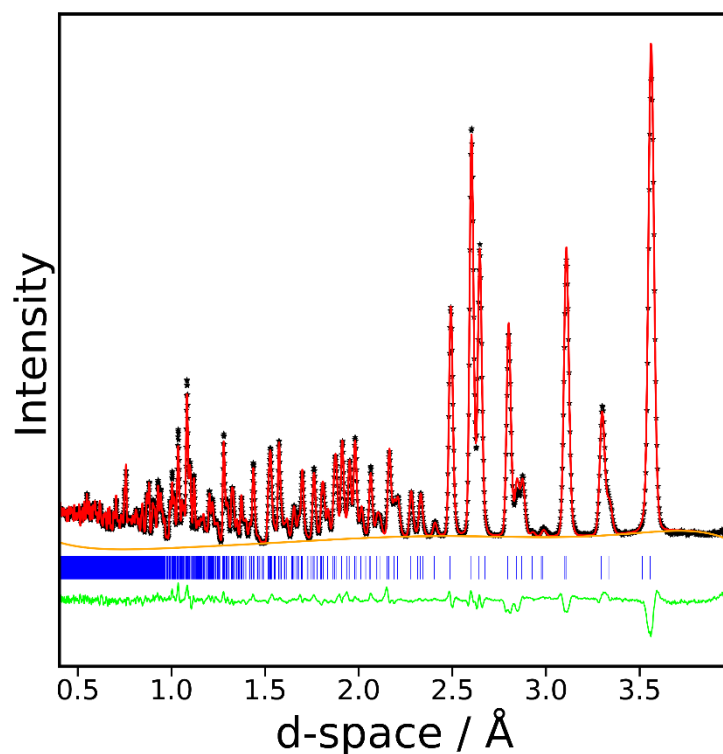
Figure S9: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at 20 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.69 % and 3.01 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
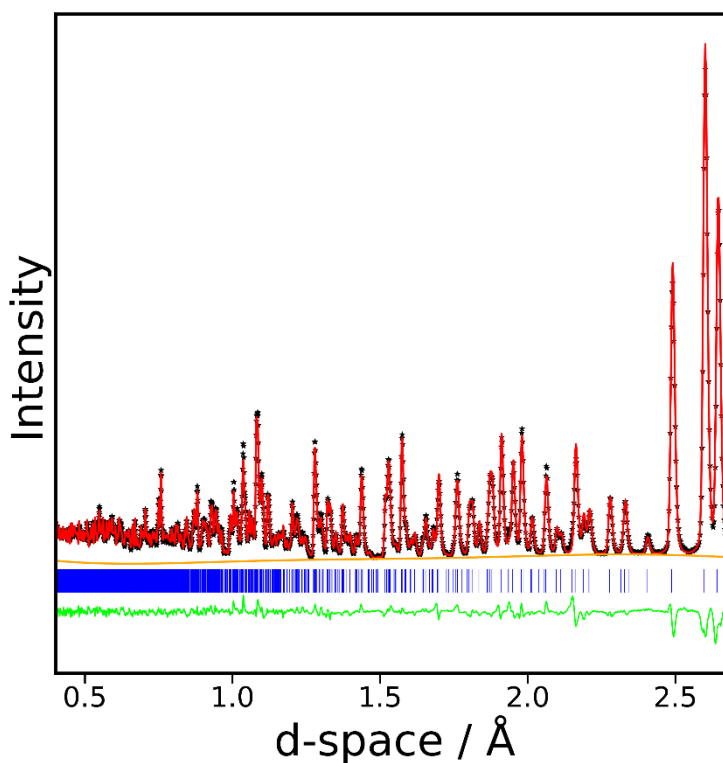

Figure S10: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at 20 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.22 % and 3.59 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
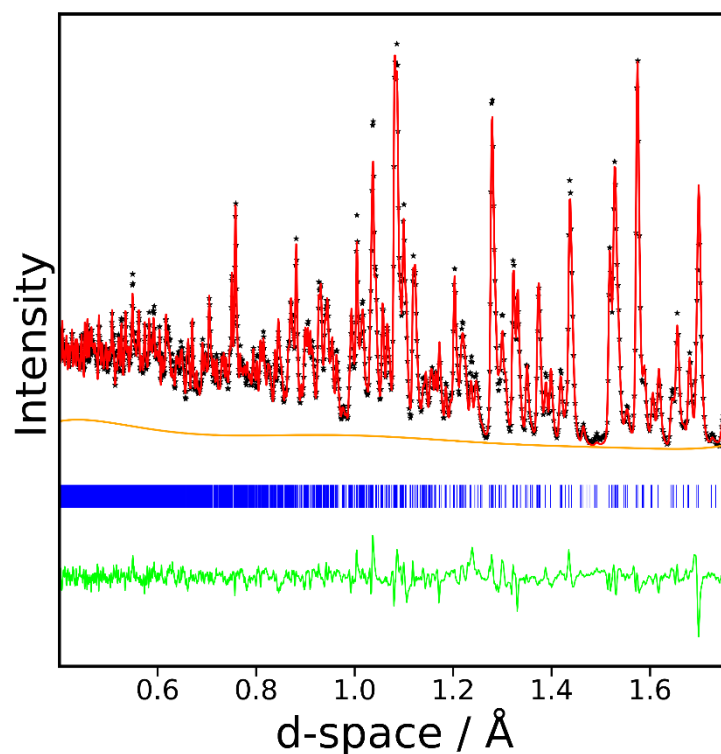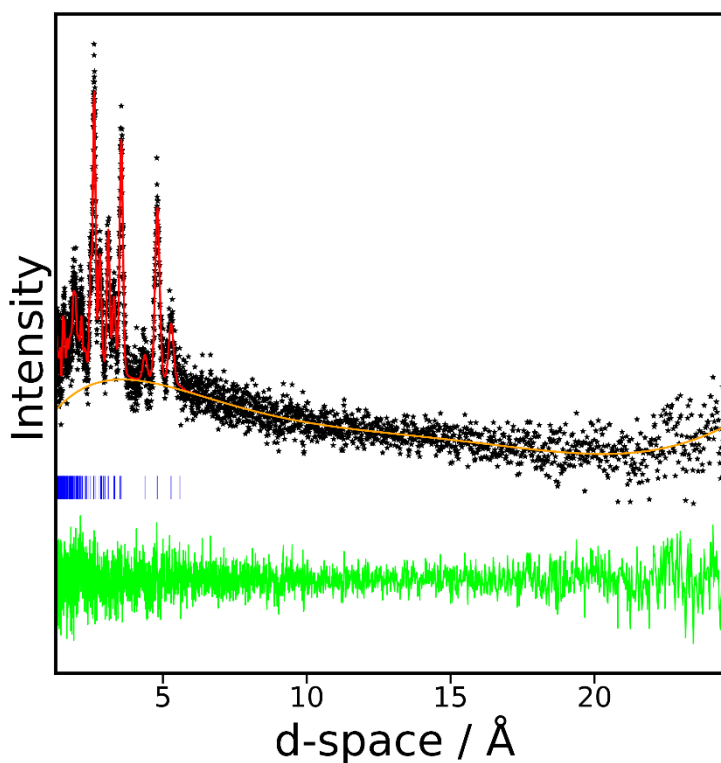
Figure S11: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 20 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.81 % and 2.25 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
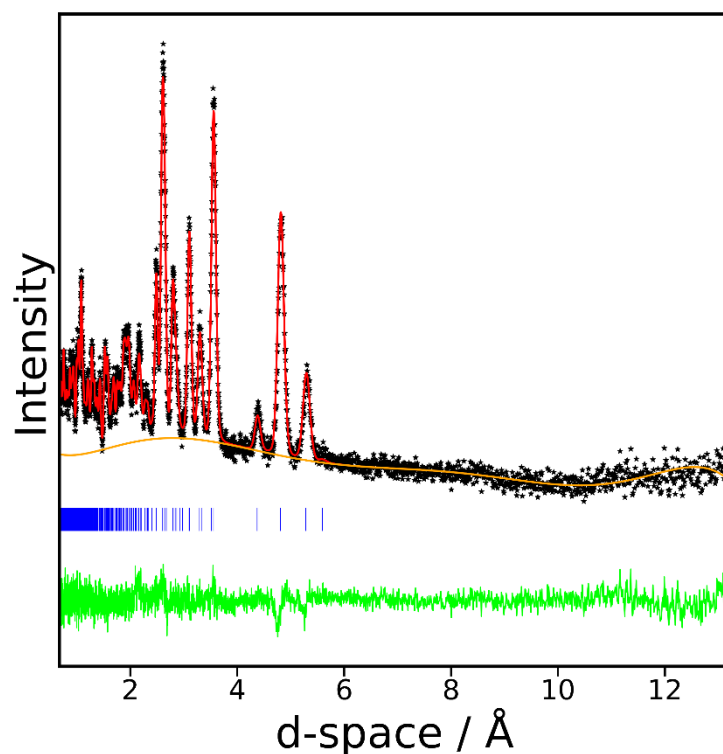

Figure S12: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 15 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.38 % and 3.86 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
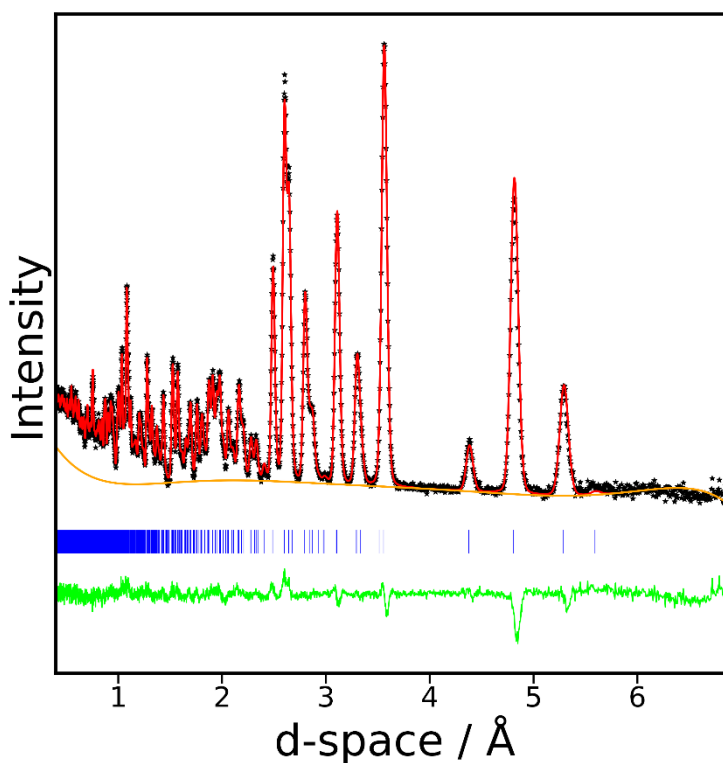
Figure S13: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at 15 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.47 % and 2.81 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
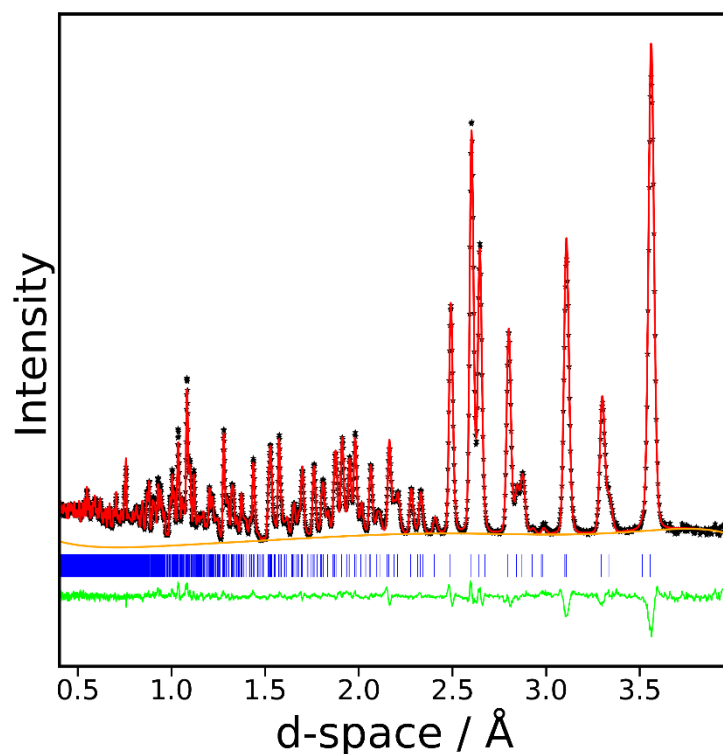

Figure S14: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at 15 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.22 % and 2.43 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
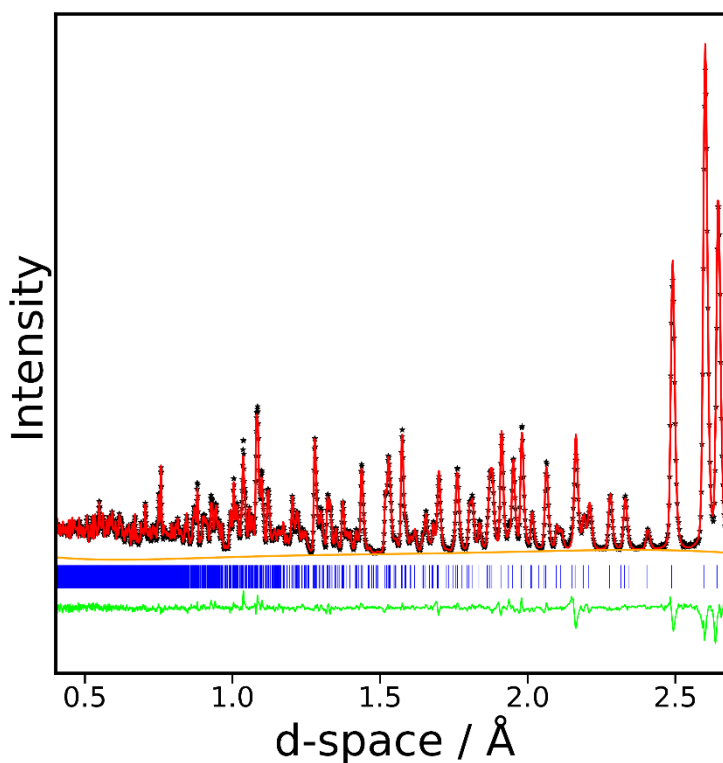
Figure S15: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at 15 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.52 % and 2.64 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
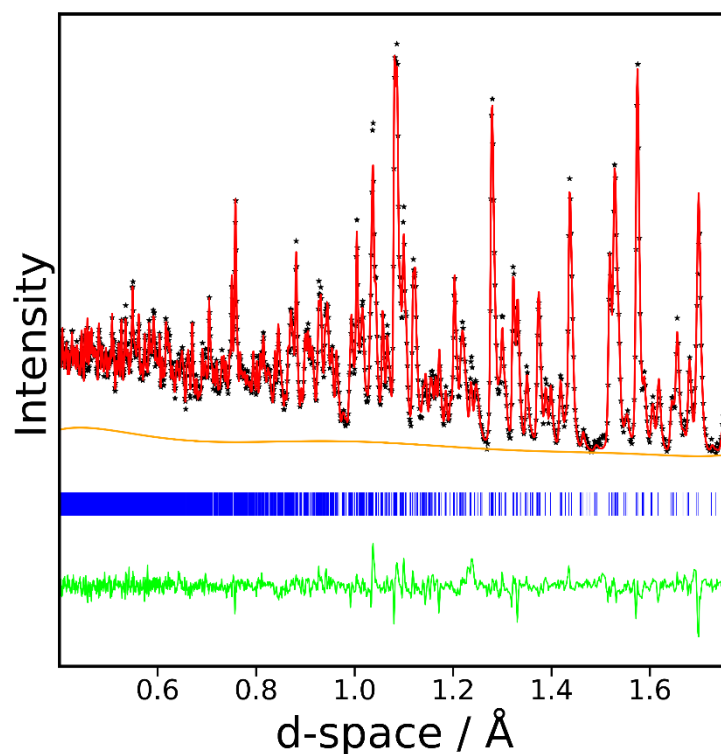

Figure S16: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at 15 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.80 % and 3.10 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
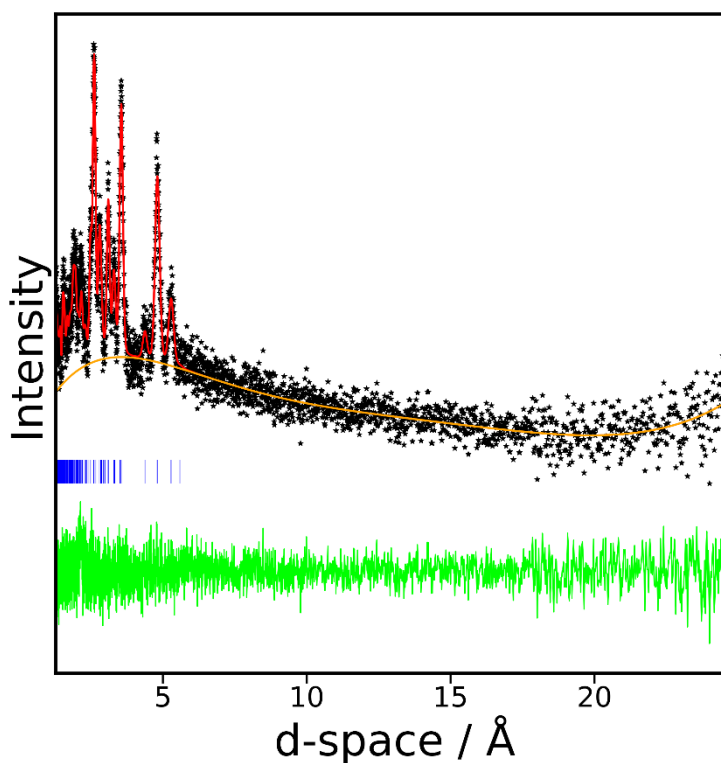
Figure S17:: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at 15 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.73 % and 2.18 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
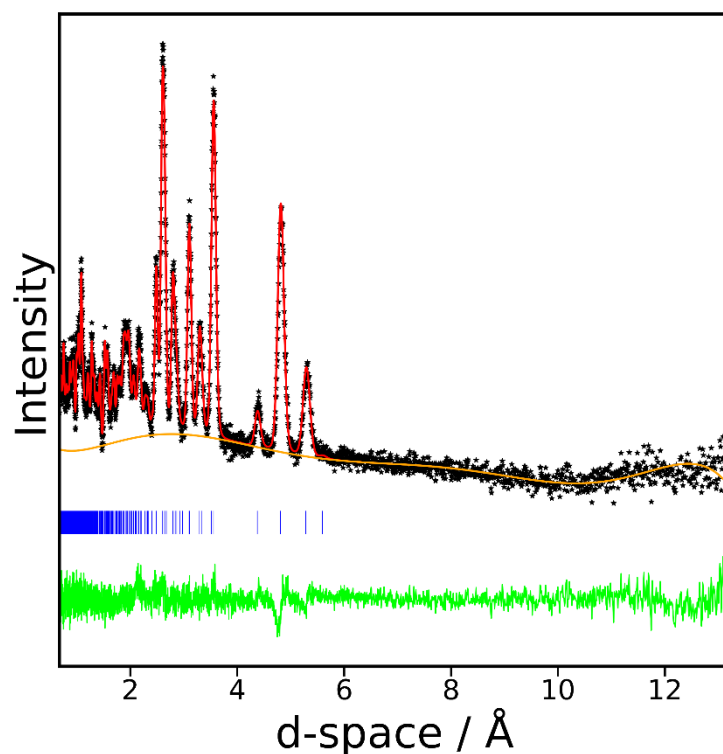

Figure S18: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at 10 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.30 % and 3.82 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
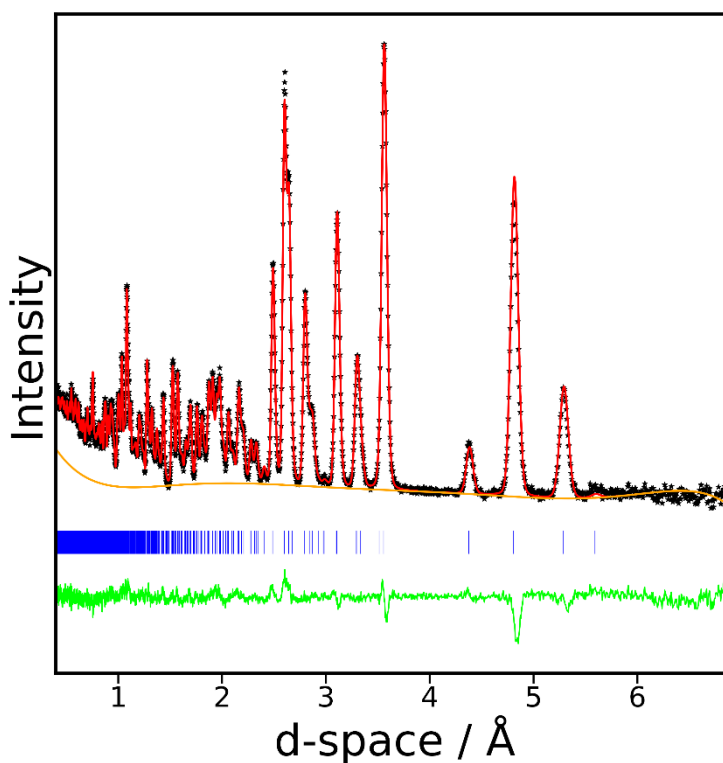
Figure S19: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at 10 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.45 % and 2.76 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
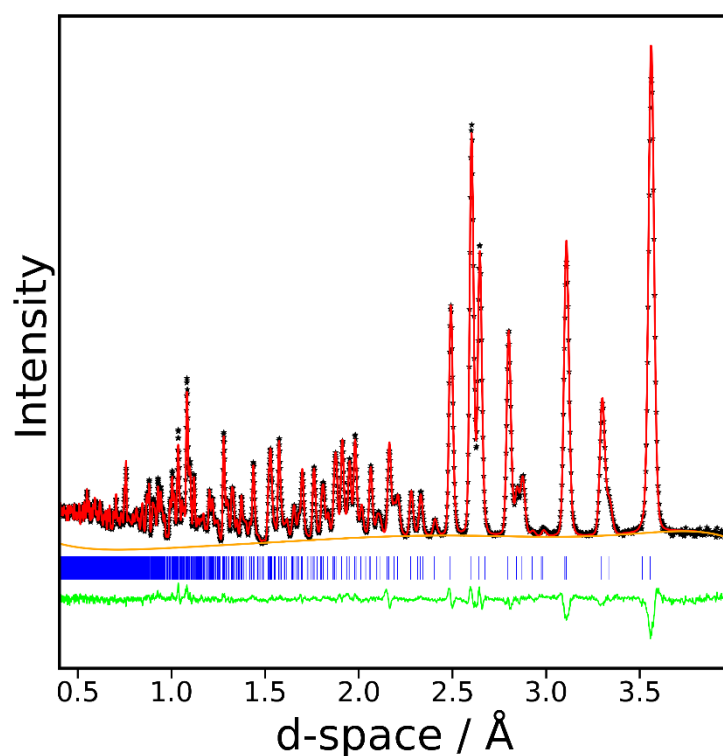

Figure S20: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at 10 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.44 % and 2.21 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
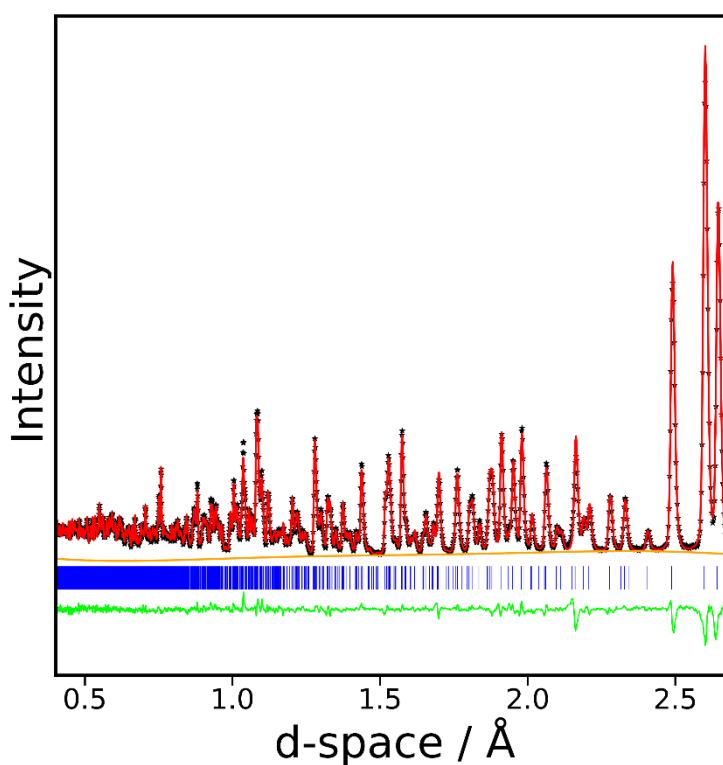
Figure S21: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 10 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.61 % and 2.47 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
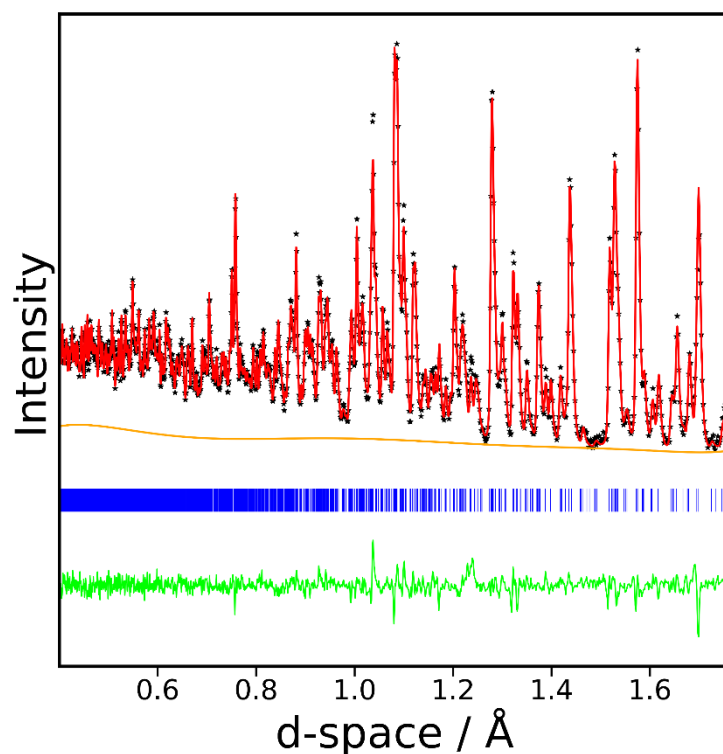

Figure S22: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 10 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.15 % and 2.86 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
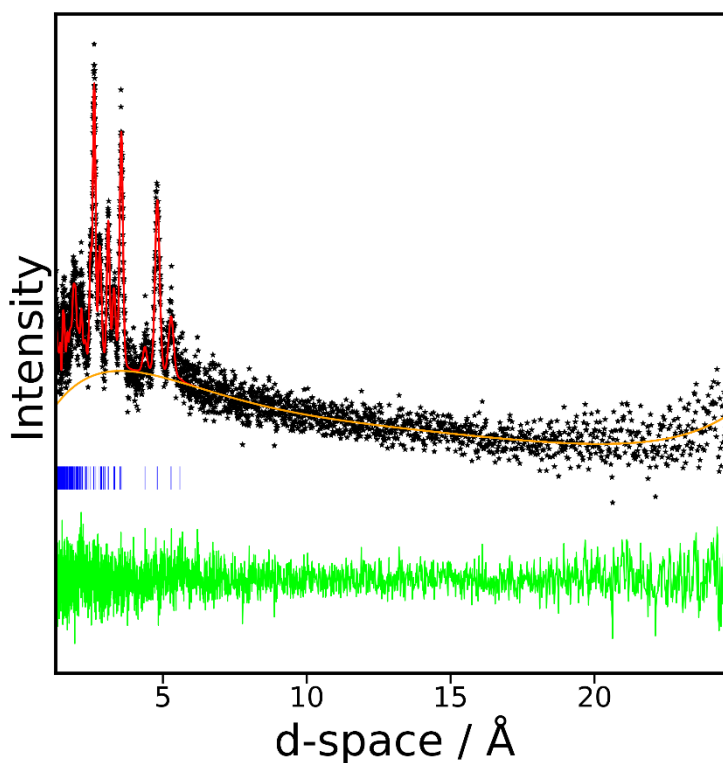
Figure S23: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 10 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.15 % and 1.71 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
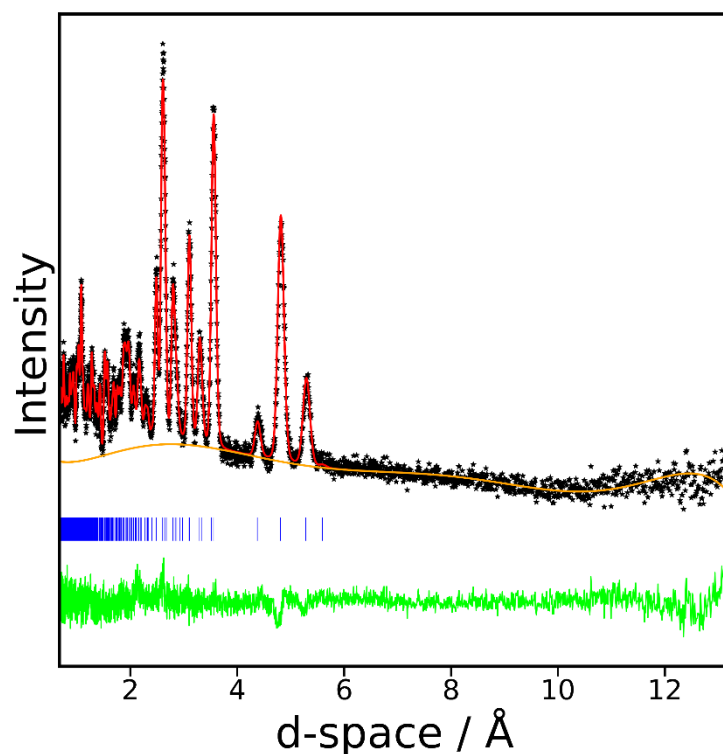

Figure S24: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 7 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.38 % and 3.82 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
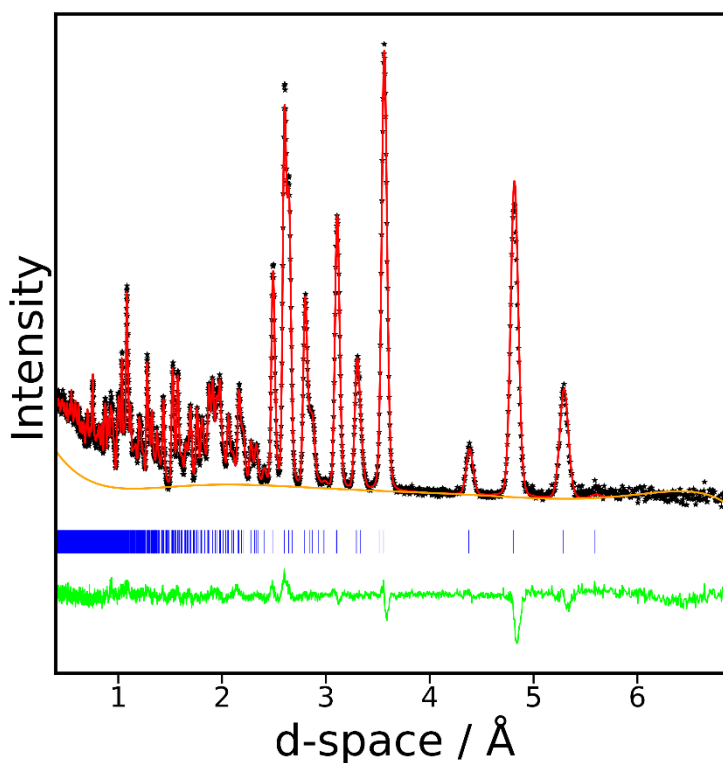
Figure S25: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 7 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_{p} and R_{wp} of 2.43 % and 2.77 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
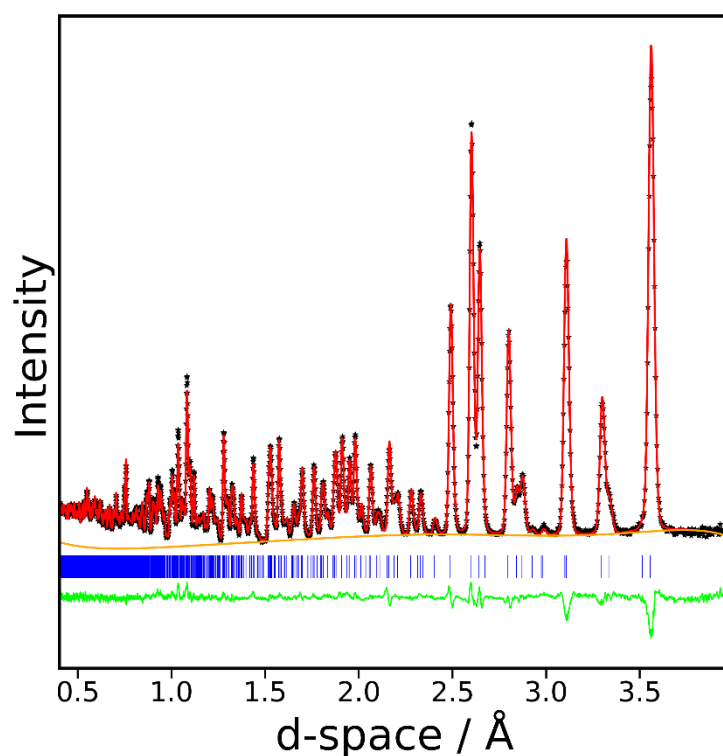

Figure S26: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 7 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_{p} and R_{wp} of 2.22 % and 2.46 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
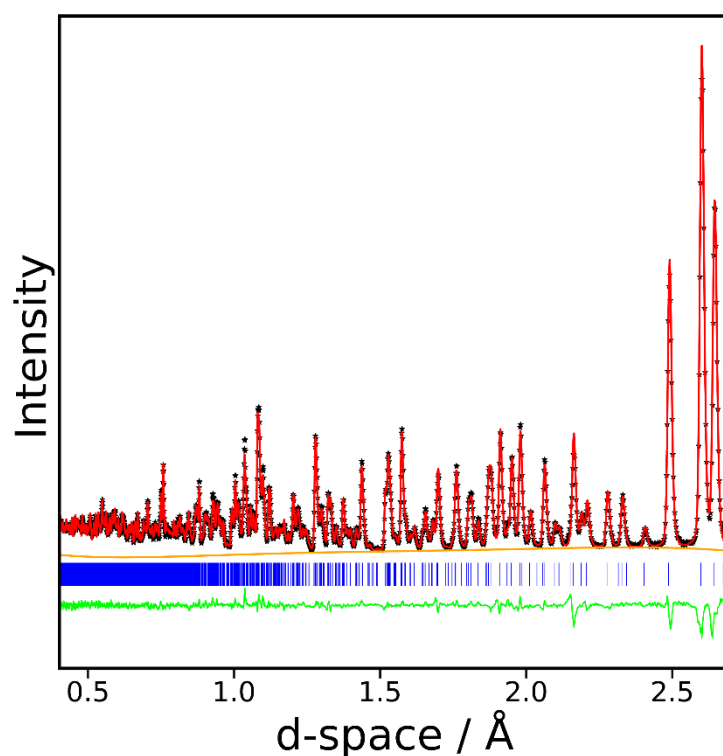
Figure S27: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 7 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.56 % and 2.64 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
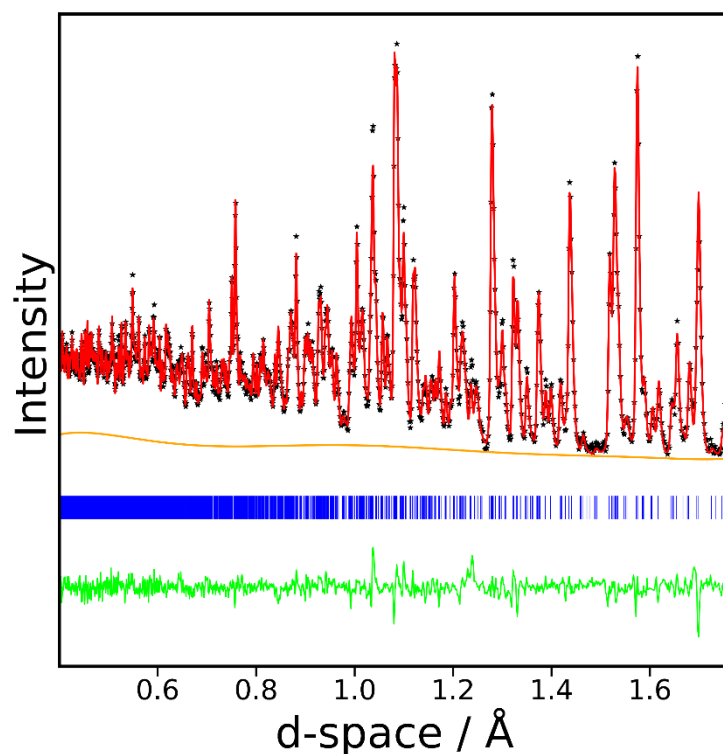

Figure S28: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 7 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.81 % and 3.09 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
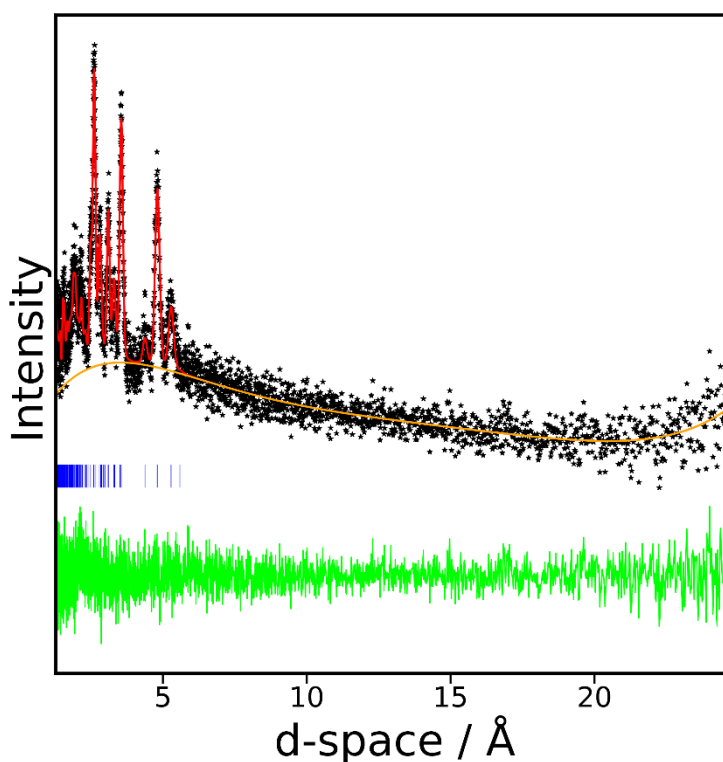
Figure S29: Neutron diffraction pattern collected from Tb(DCO₂)(C₂O₄) at 7 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.71 % and 2.16 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
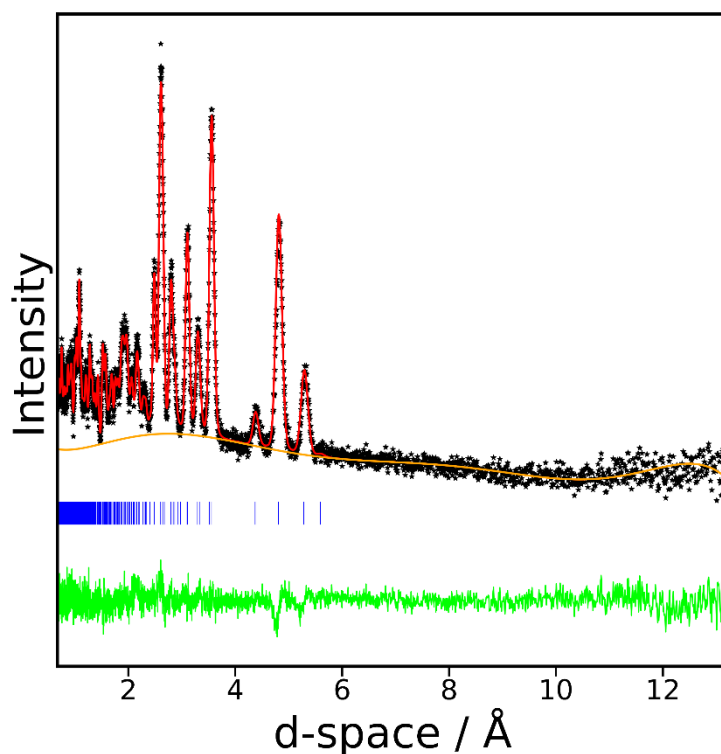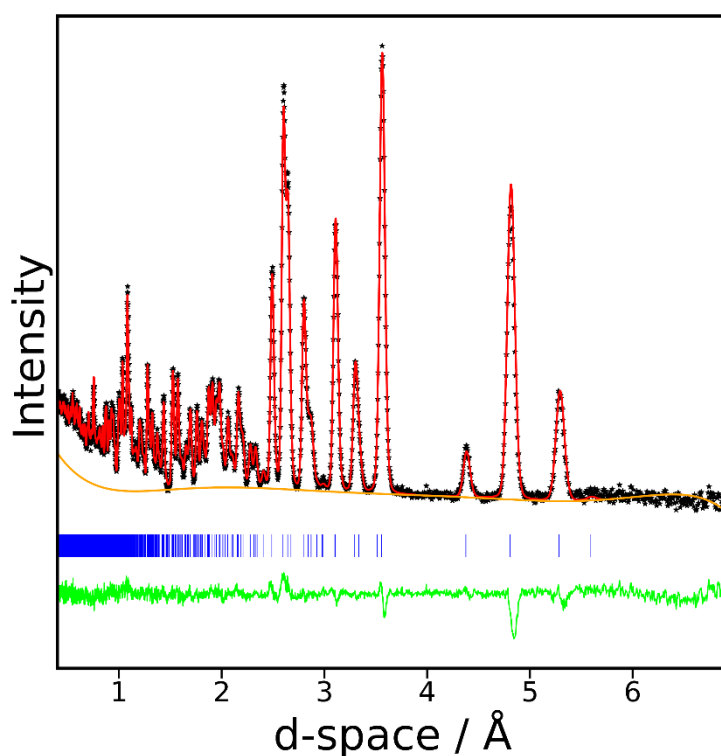

Figure S30: Neutron diffraction pattern collected from Tb(DCO₂)(C₂O₄) at 5 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.33 % and 3.92 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
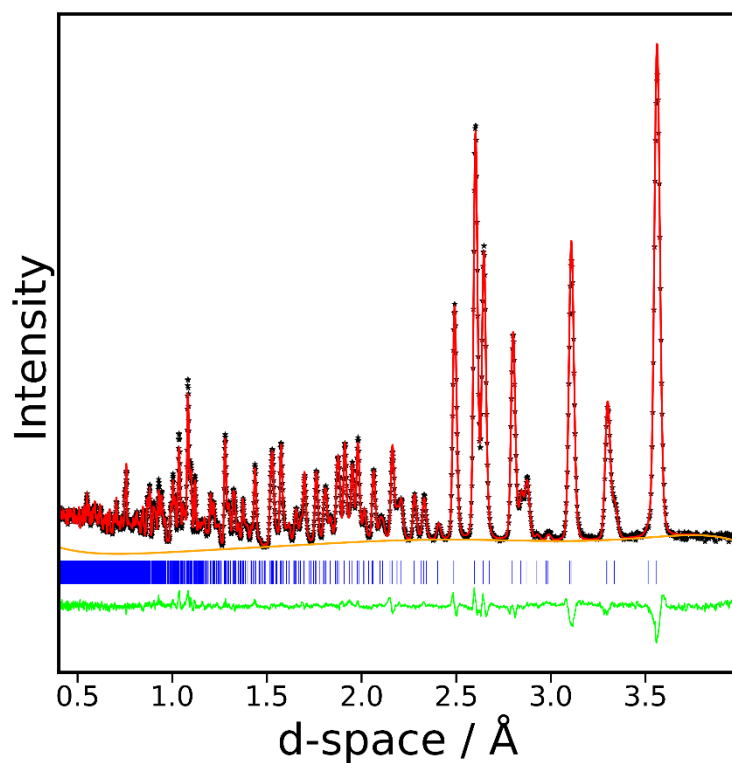
Figure S31: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at 5 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.52 % and 2.80 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
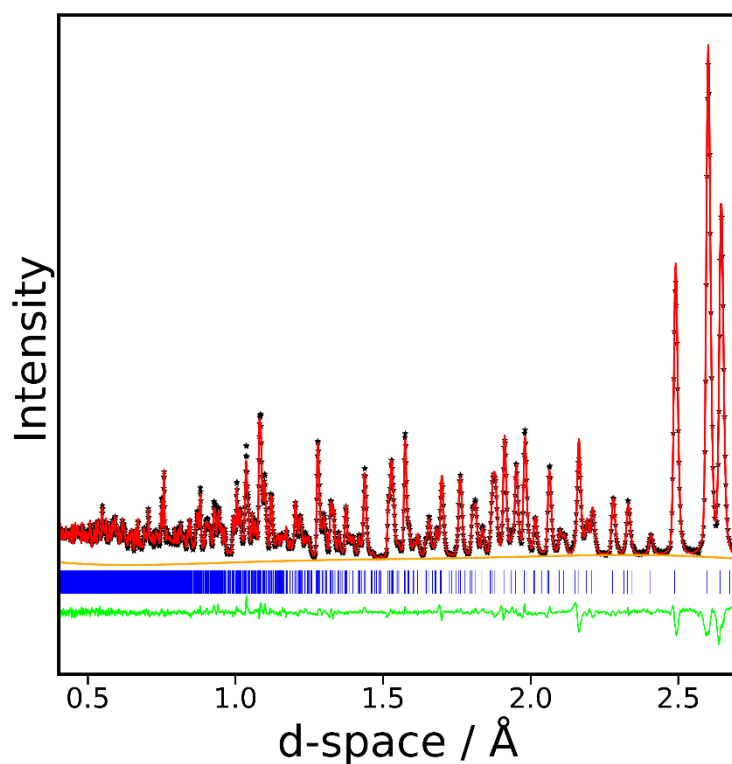

Figure S32: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at 5 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.21 % and 2.44 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
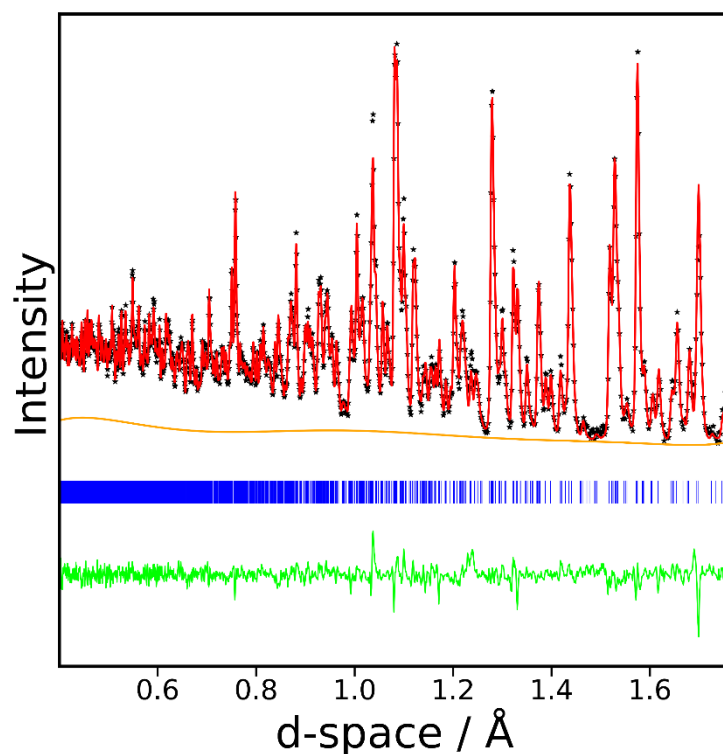
Figure S33: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 5 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.45 % and 2.62 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
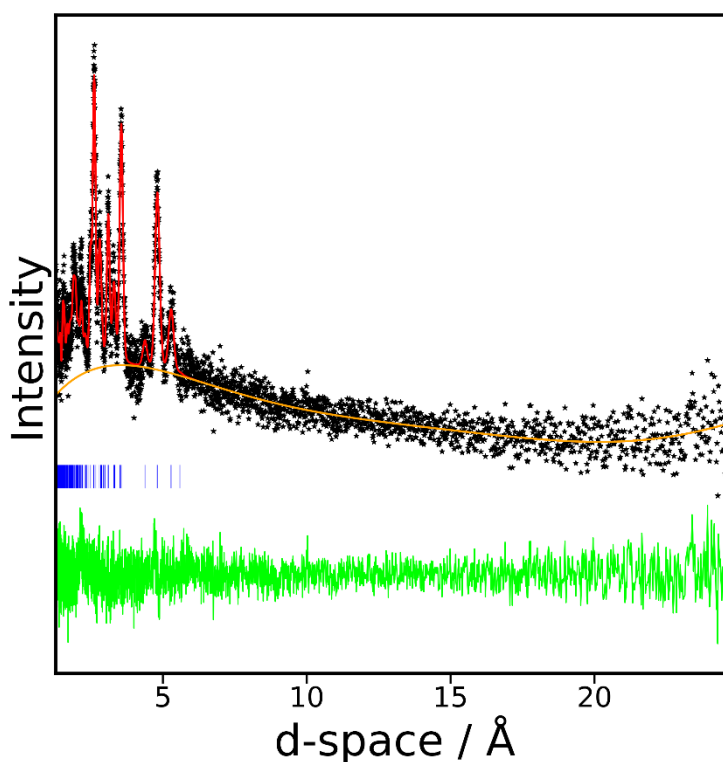

Figure S34: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 5 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.84 % and 3.11 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
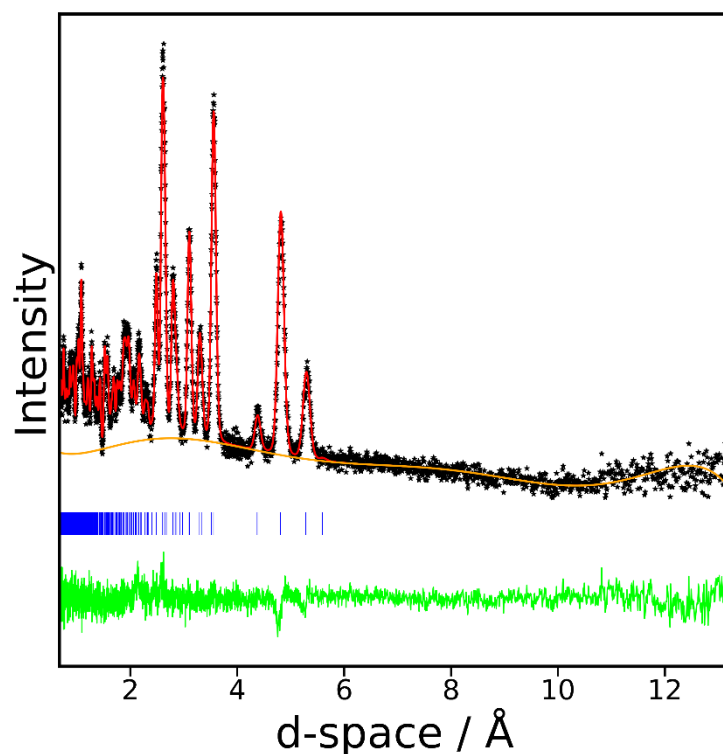
Figure S35: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 5 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.72 % and 2.16 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
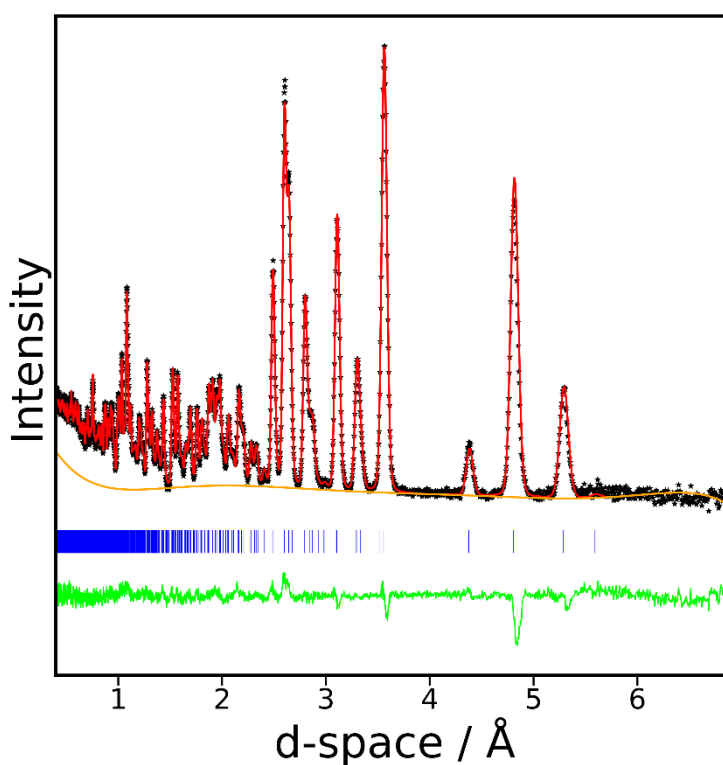

Figure S36: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 3 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.44 % and 3.91 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
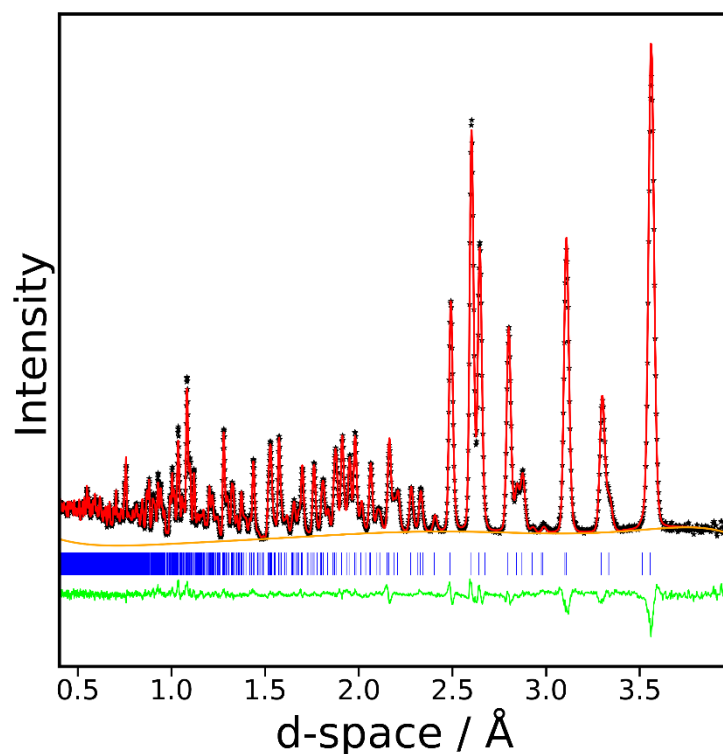
Figure S37: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 3 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.41 % and 2.76 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
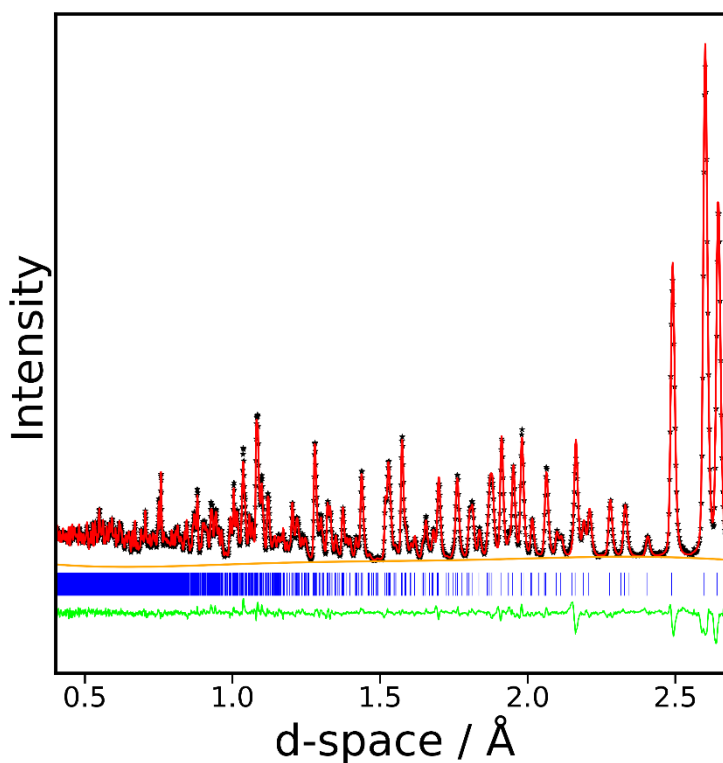

Figure S38: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 3 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.19 % and 2.46 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
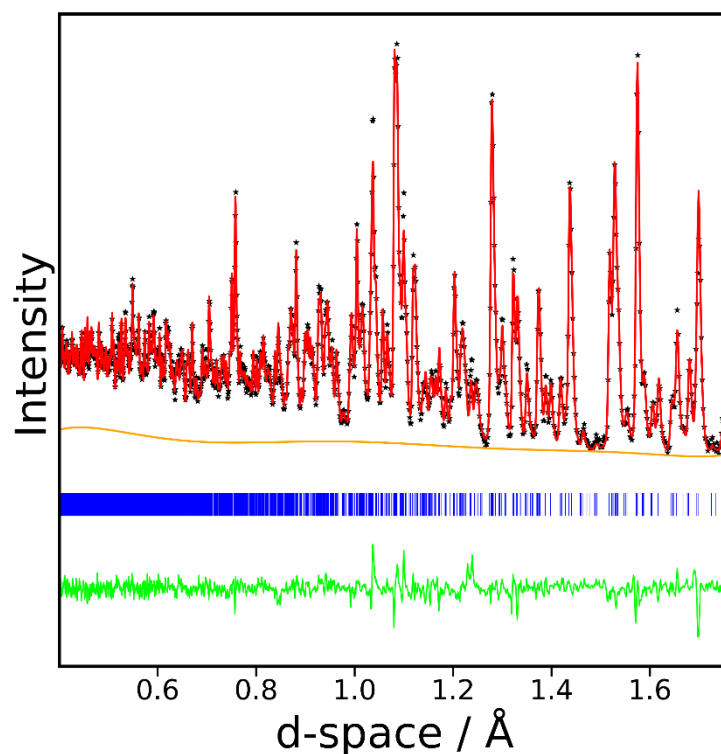
Figure S39: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at 3 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.54 % and 2.62 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
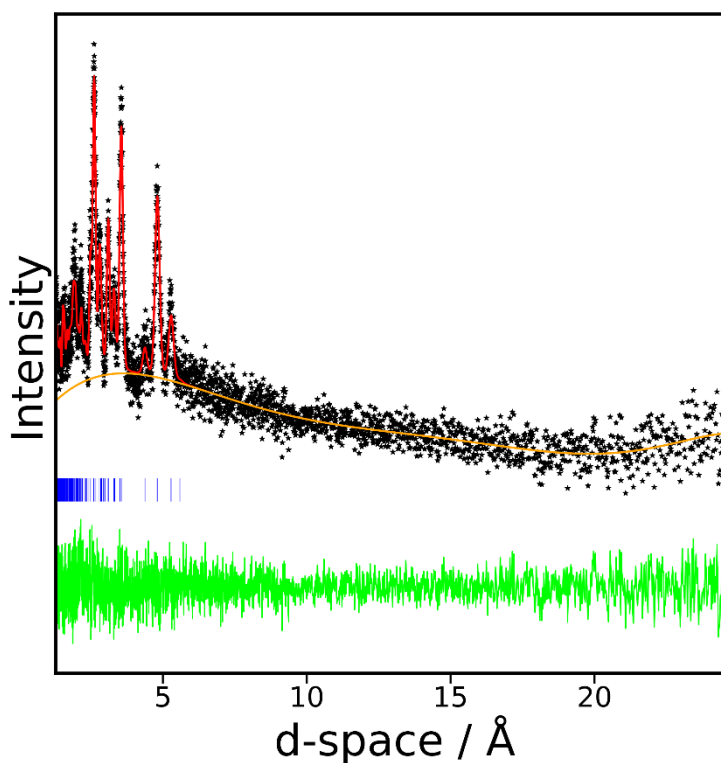

Figure S40: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at 3 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.83 % and 3.11 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
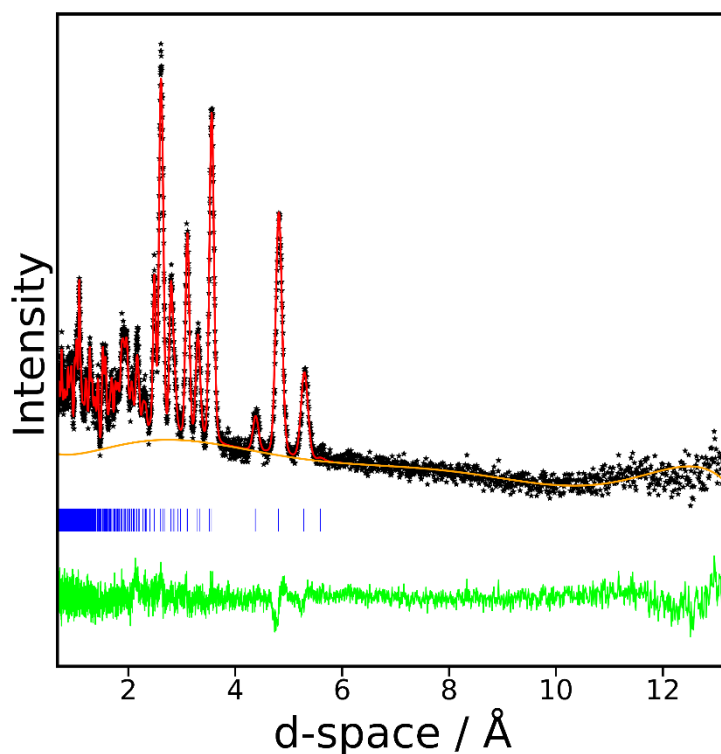
Figure S41: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at 3 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.68 % and 2.15 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
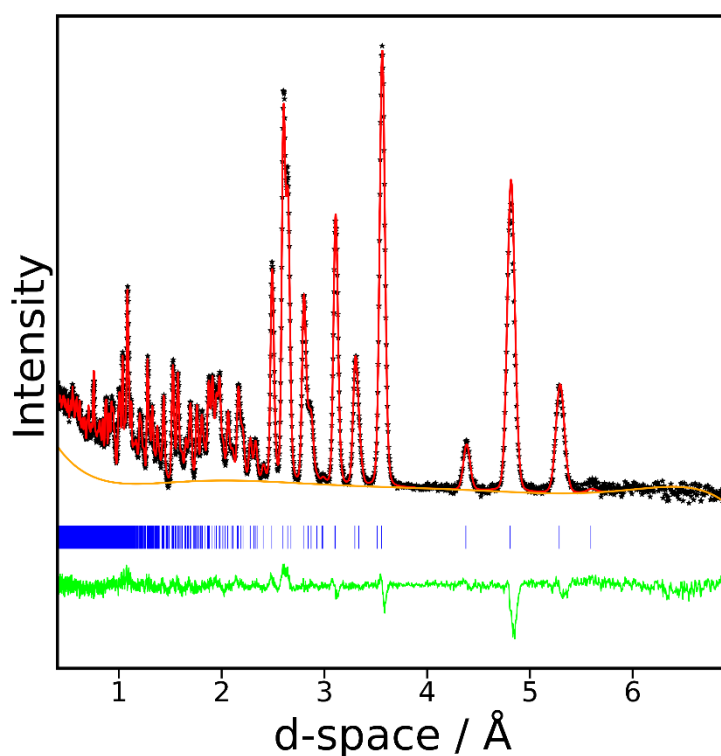

Figure S42: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at 2.5 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.42 % and 3.90 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
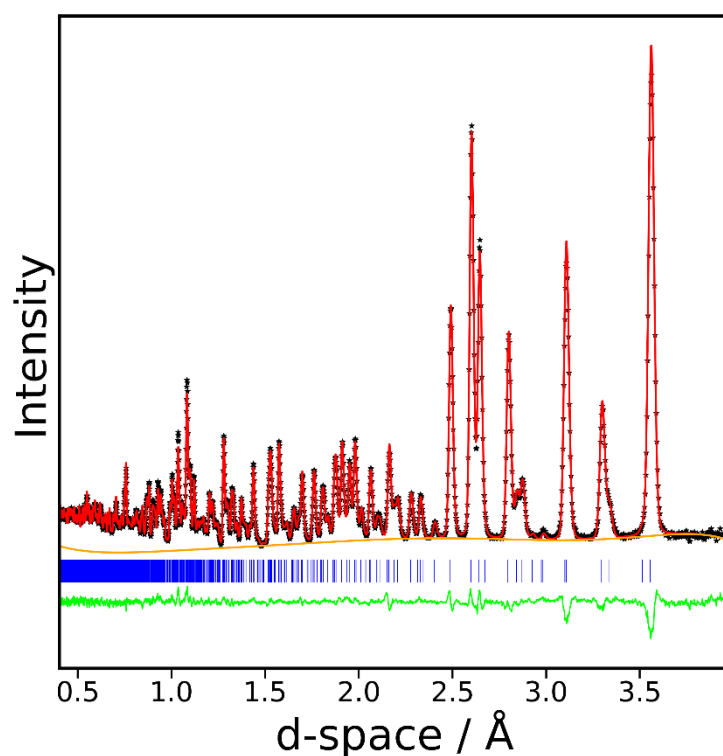
Figure S44: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 2.5 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 2.49 % and 2.81 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
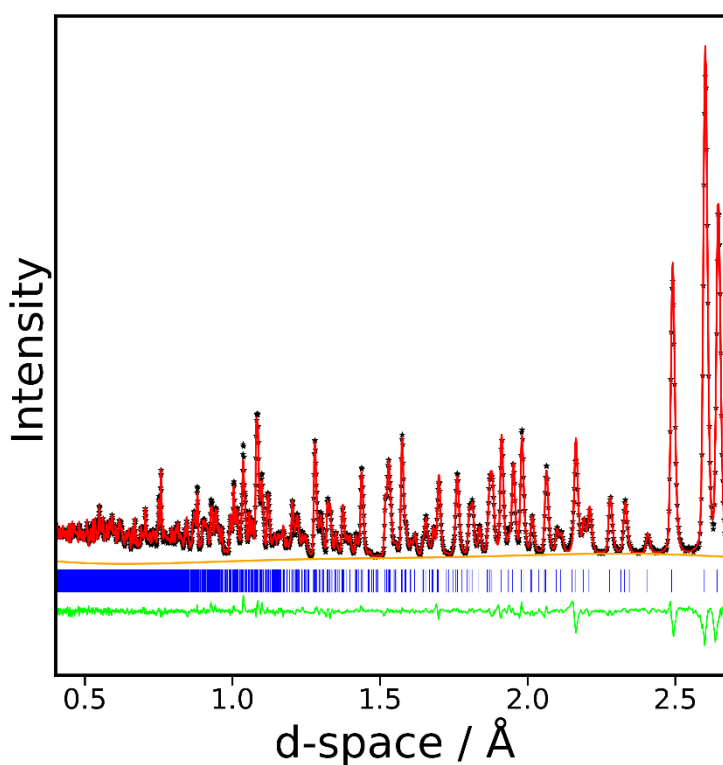

Figure S45: Neutron diffraction pattern collected from Tb(DCO$_2$)(C$_2$O$_4$) at 2.5 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 2.17 % and 2.45 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
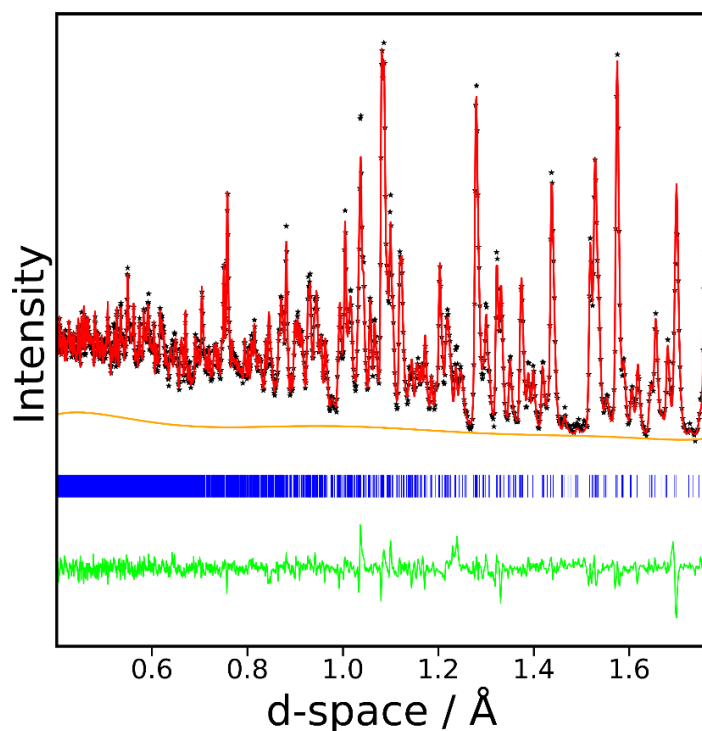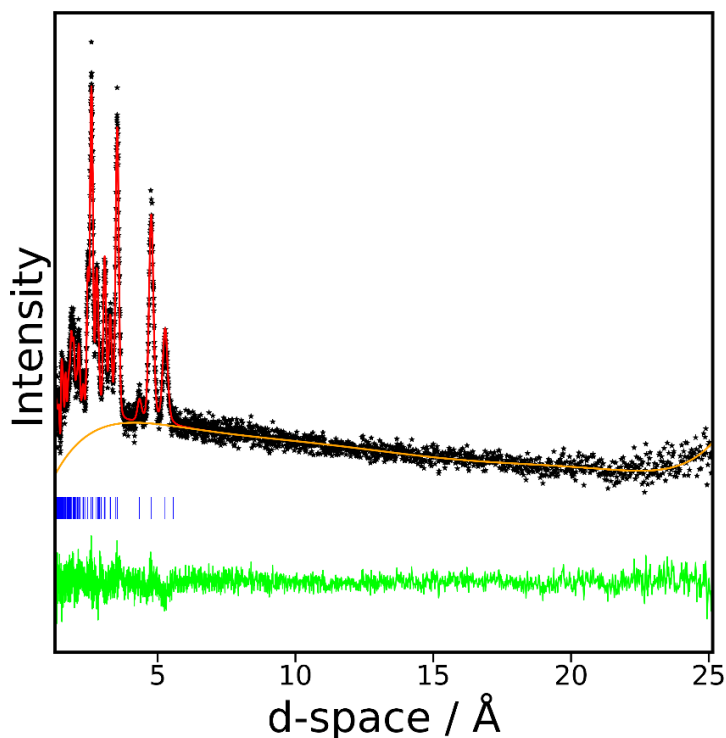
Figure S46: Neutron diffraction pattern collected from Tb(DCO₂)(C₂O₄) at 2.5 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.49 % and 2.61 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.

Figure S47: Neutron diffraction pattern collected from Tb(DCO₂)(C₂O₄) at 2.5 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.83 % and 3.09 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
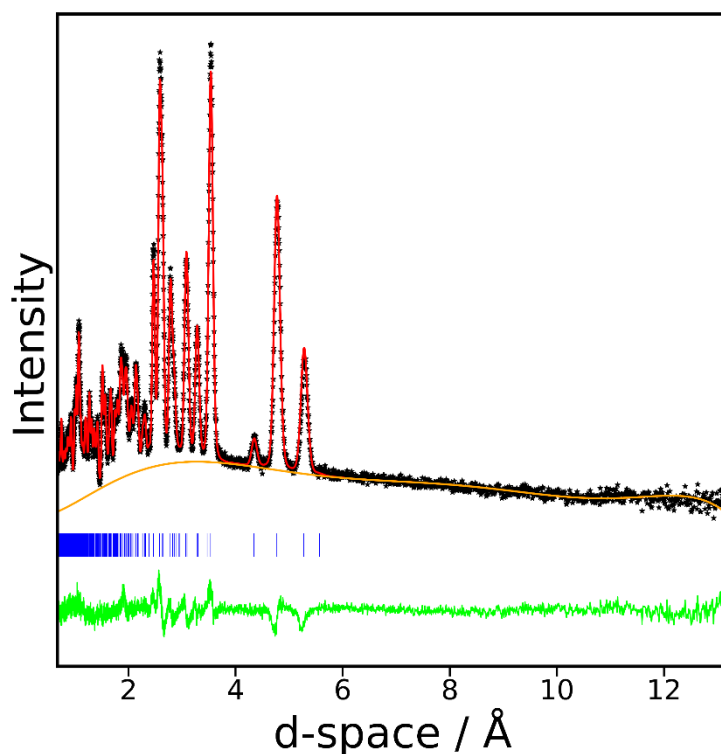
Figure S48: Neutron diffraction pattern collected from $Tb(DCO_2)(C_2O_4)$ at 2.5 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.67 % and 2.16 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
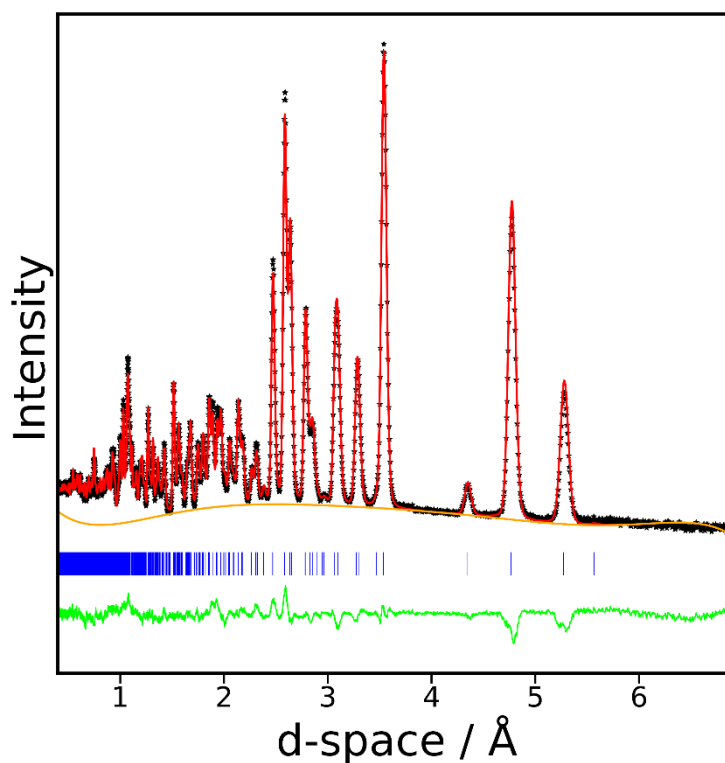
Neutron diffraction patterns and Rietveld refinements for $Ho(DCO_2)(C_2O_4)$

Figure S49: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at room temperature using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.43 % and 3.96 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
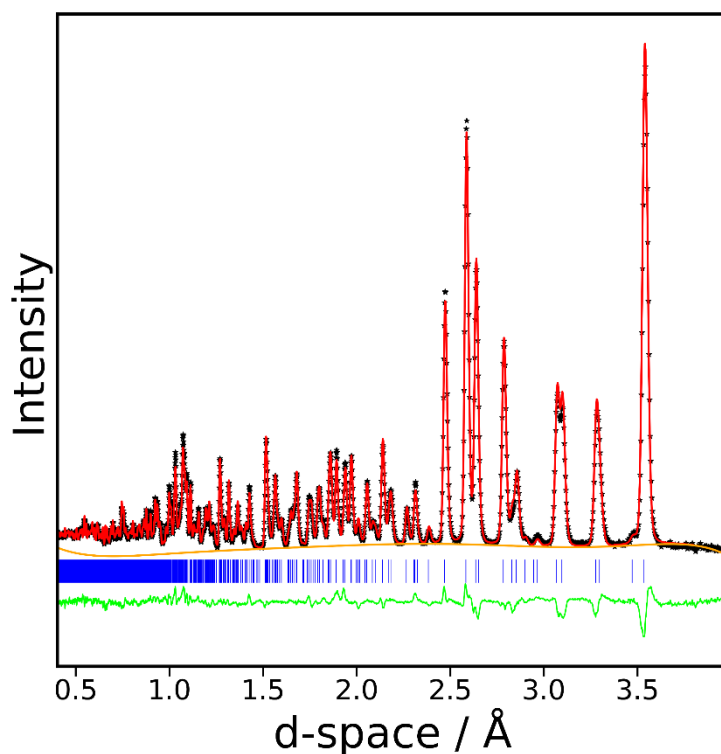
Figure S50: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at room temperature using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.61 % and 3.22 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
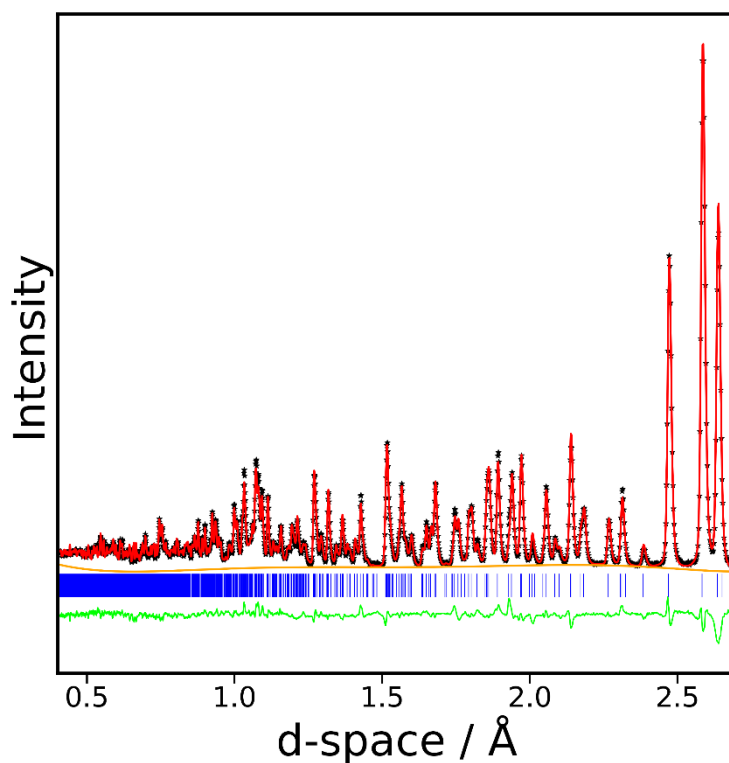

Figure S51: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at room temperature using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.58 % and 3.01 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
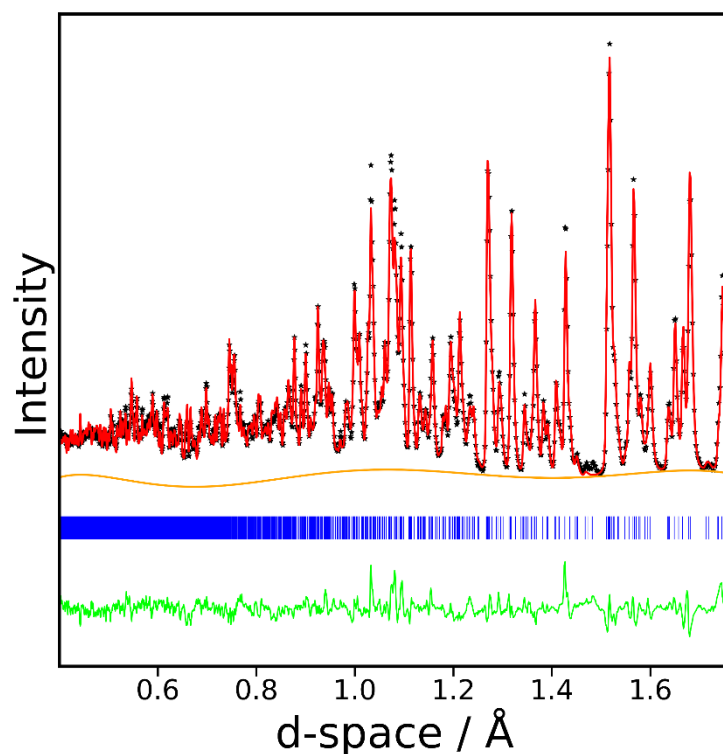
Figure S52: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at room temperature using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.00 % and 3.32 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
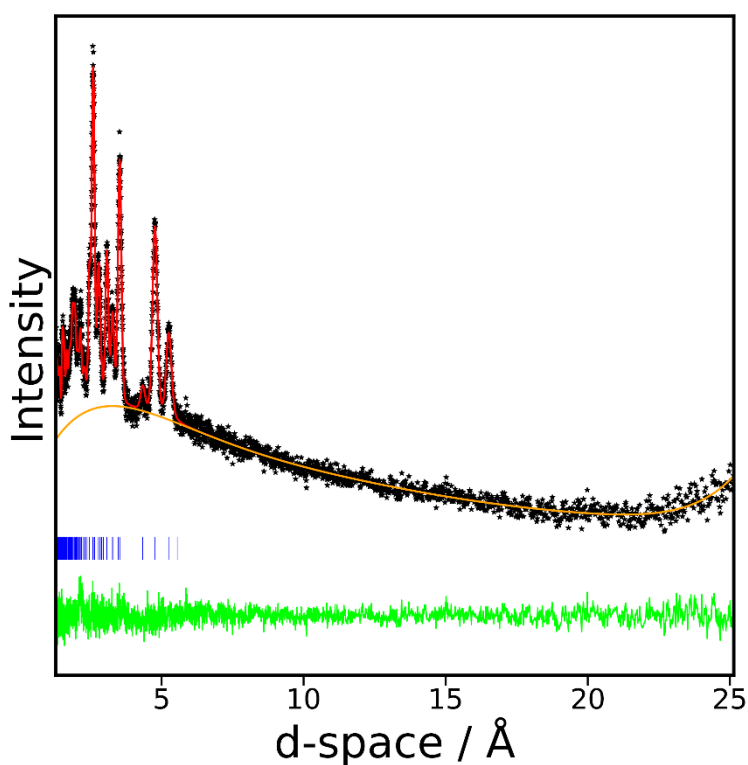

Figure S53: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at room temperature using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.94 % and 3.47 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
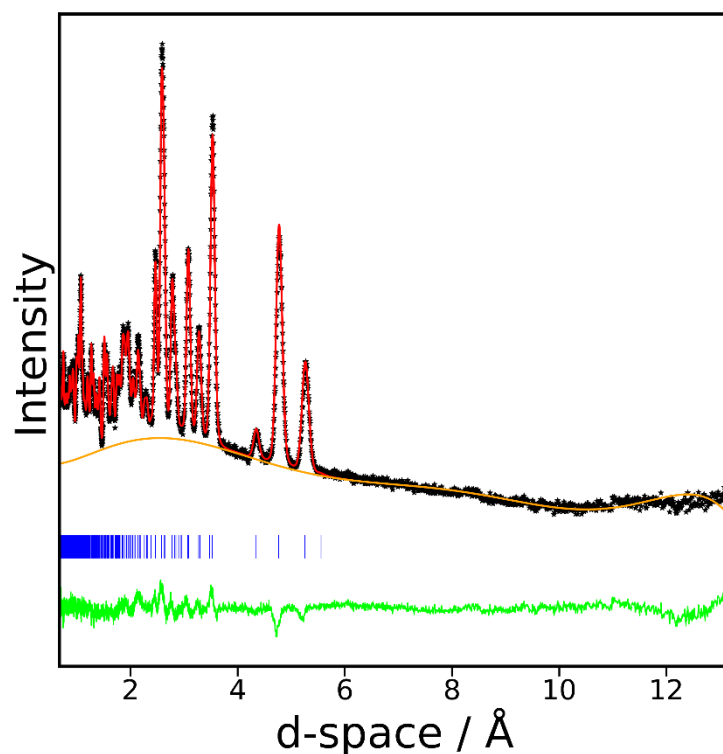
Figure S54: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at room temperature using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.65 % and 3.25 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
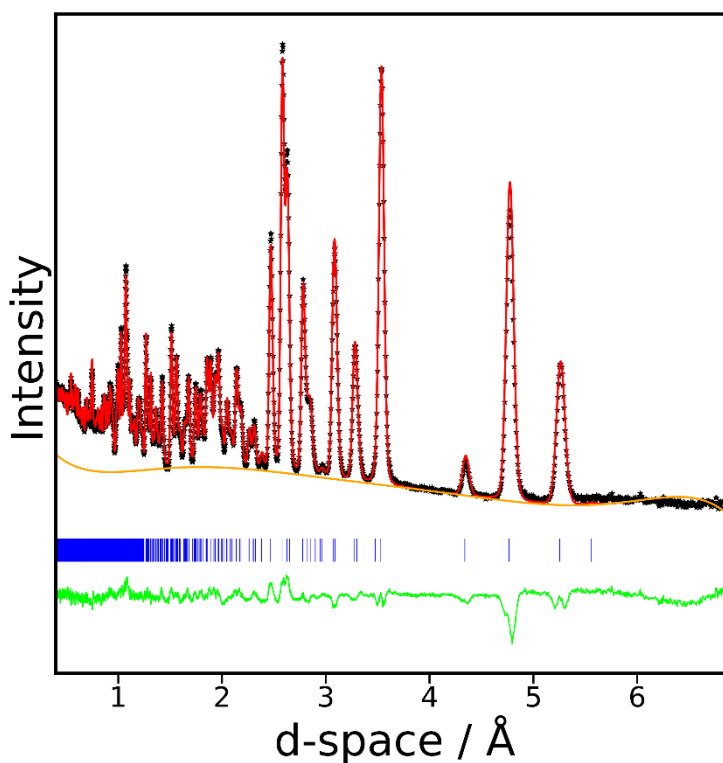

Figure S55: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 20 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.62 % and 1.91 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
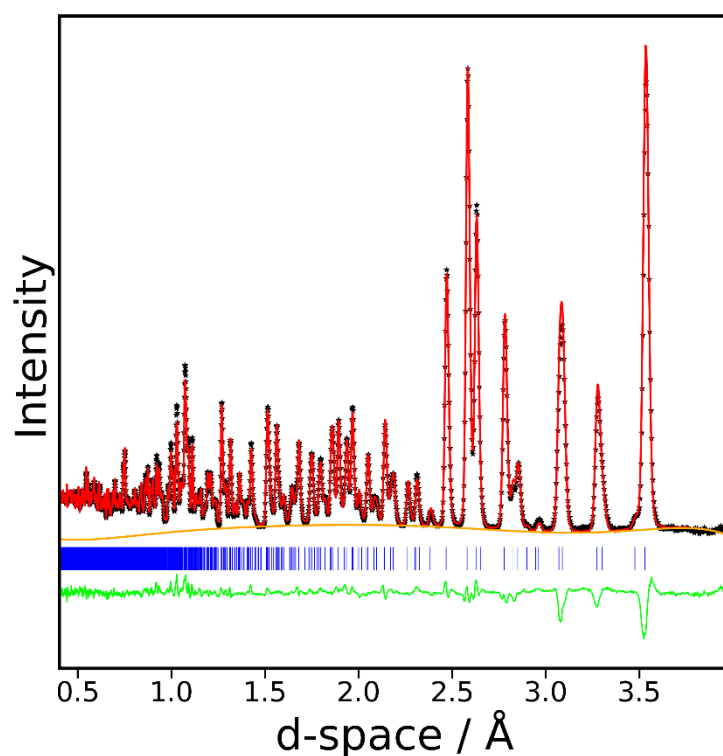
Figure S56: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 20 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.65 % and 1.85 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
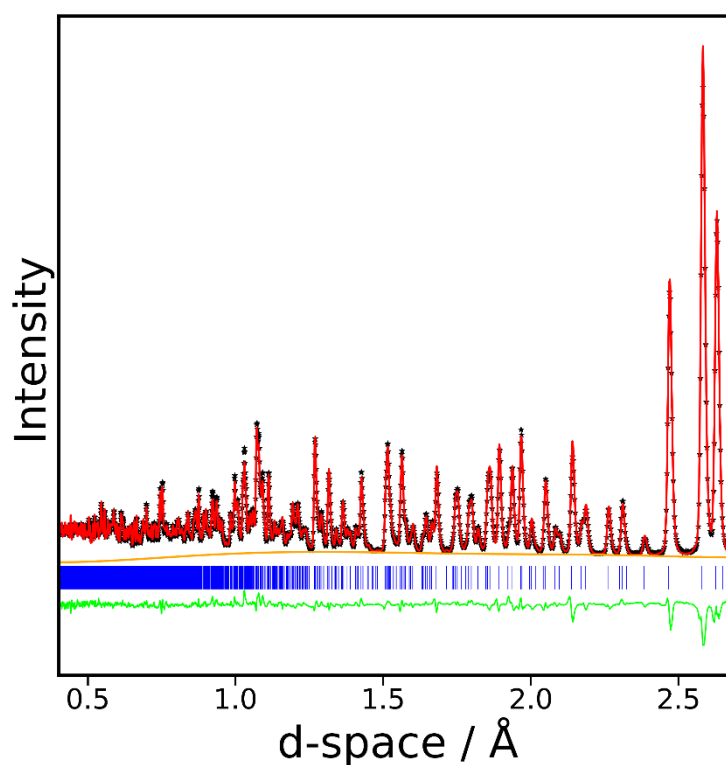

Figure S57: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 20 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.24 % and 2.31 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
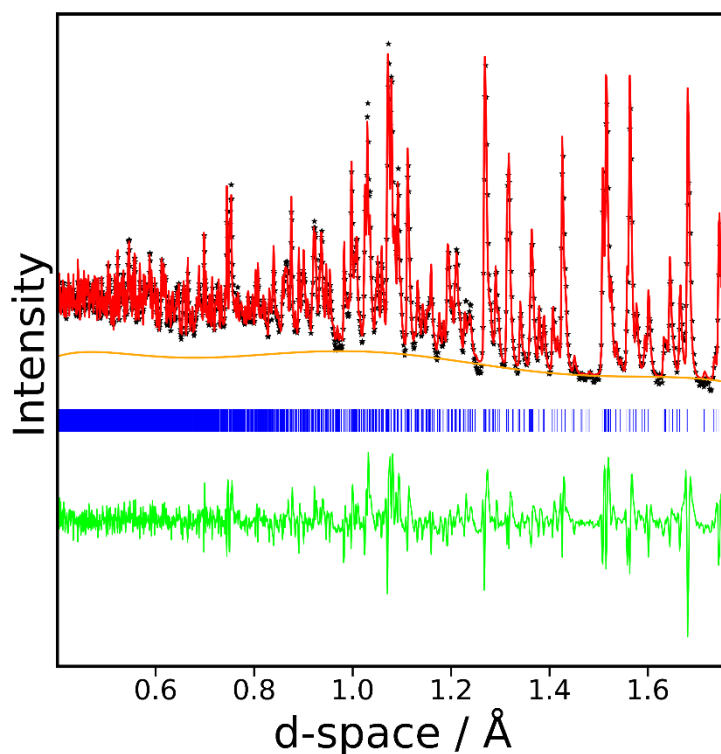
Figure S58: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 20 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 2.60 % and 2.71 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
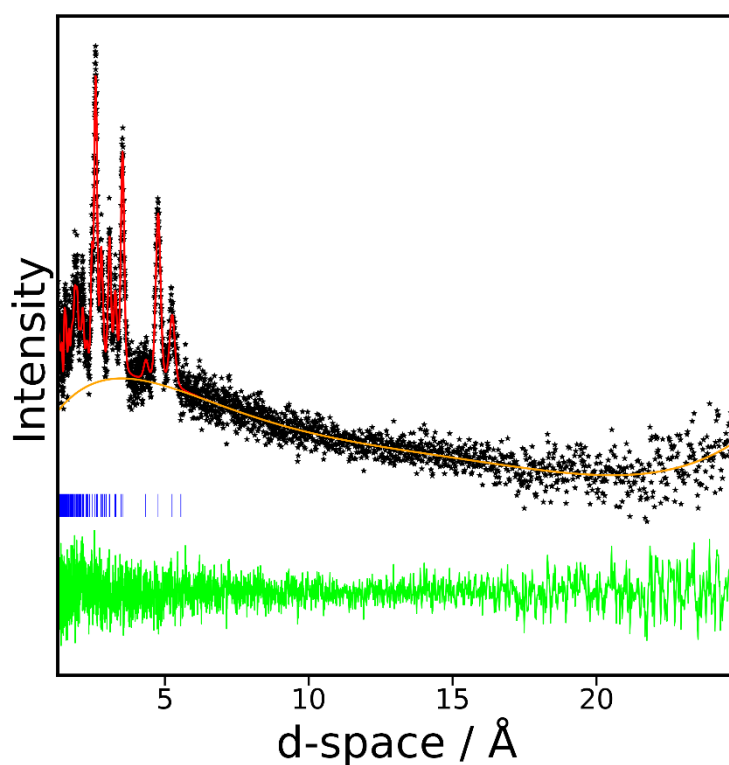

Figure S59: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 20 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 2.82 % and 2.99 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
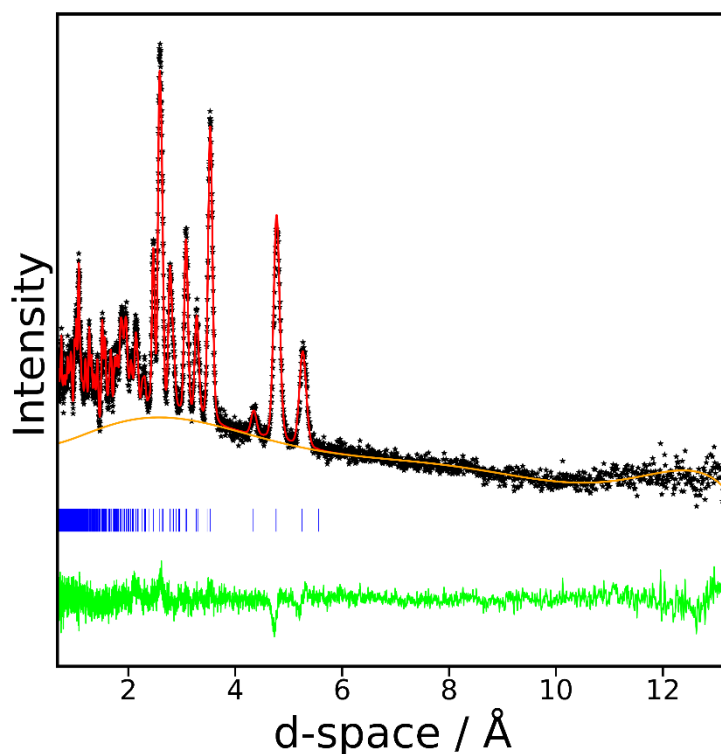
Figure S60: Neutron diffraction pattern collected from Ho(DCO₂)(C₂O₄) at 20 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.69 % and 2.14 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
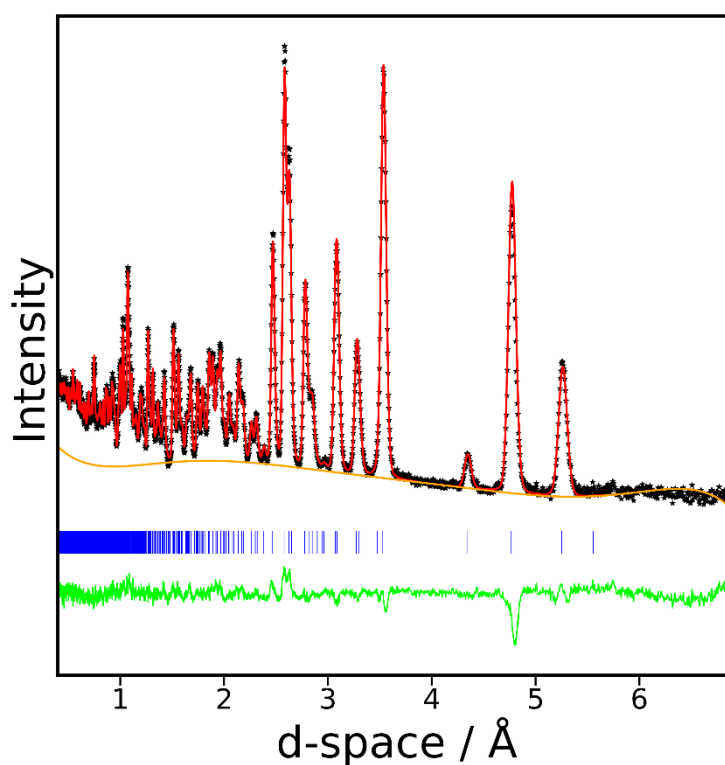

Figure S61: Neutron diffraction pattern collected from Ho(DCO₂)(C₂O₄) at 15 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.53 % and 3.94 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
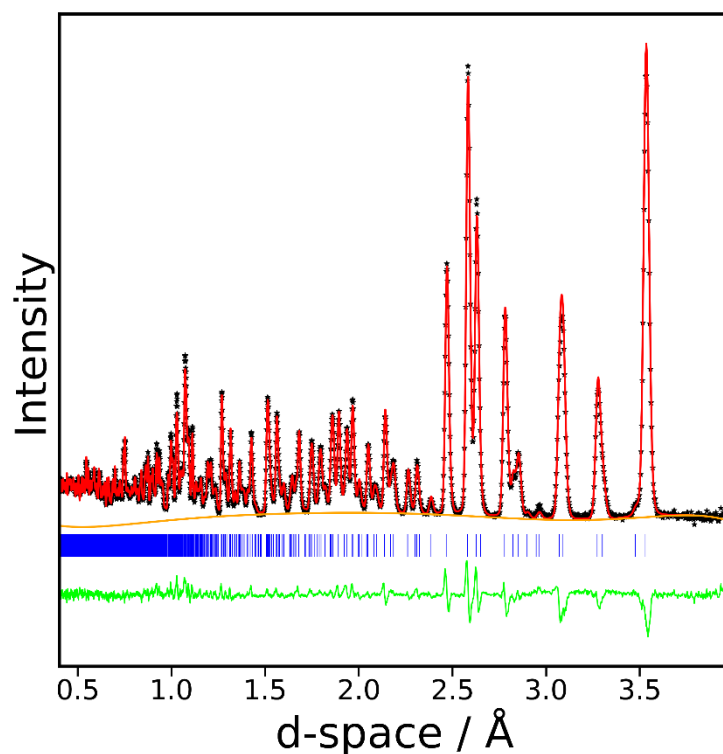
Figure S62: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 15 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.55 % and 2.86 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
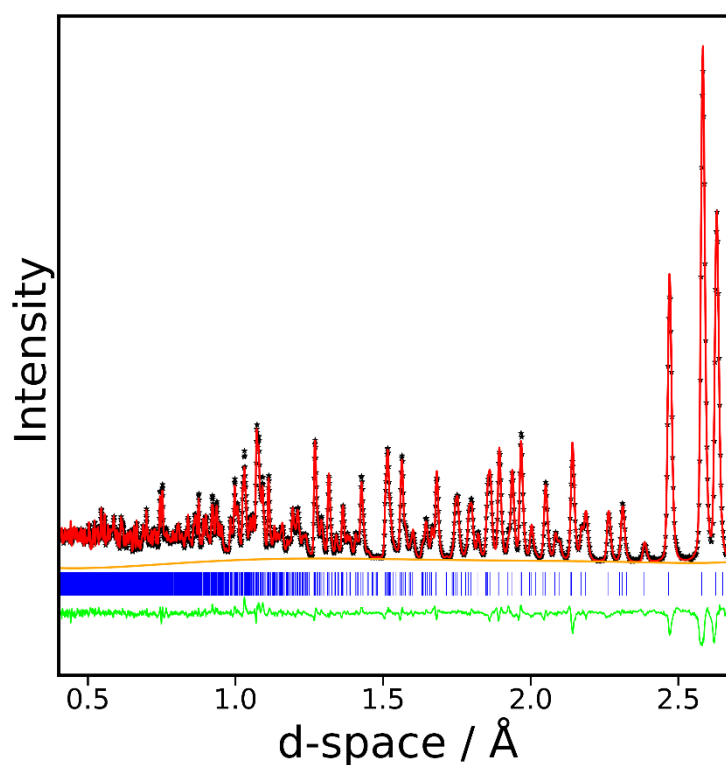

Figure S63: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 15 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.47 % and 2.68 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
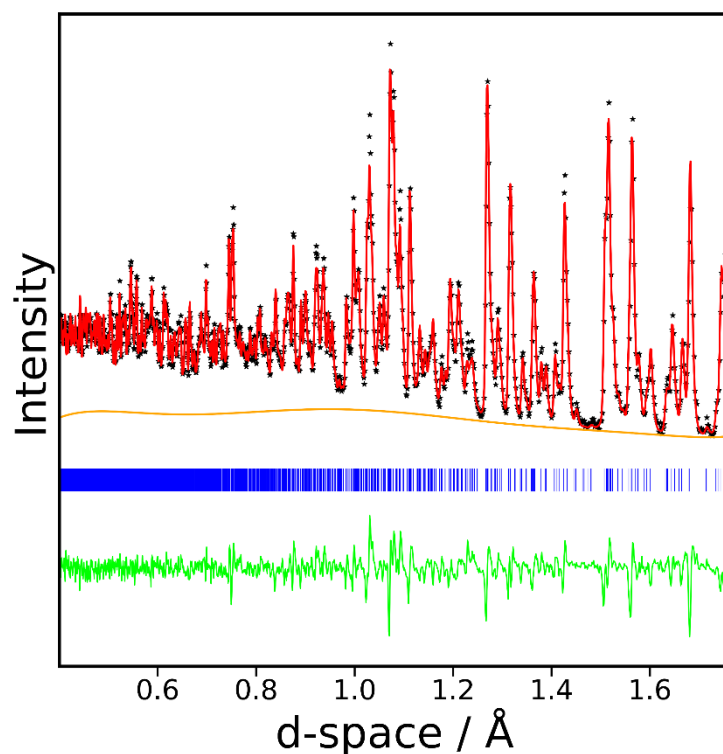
Figure S64: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 15 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.15 % and 3.37 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
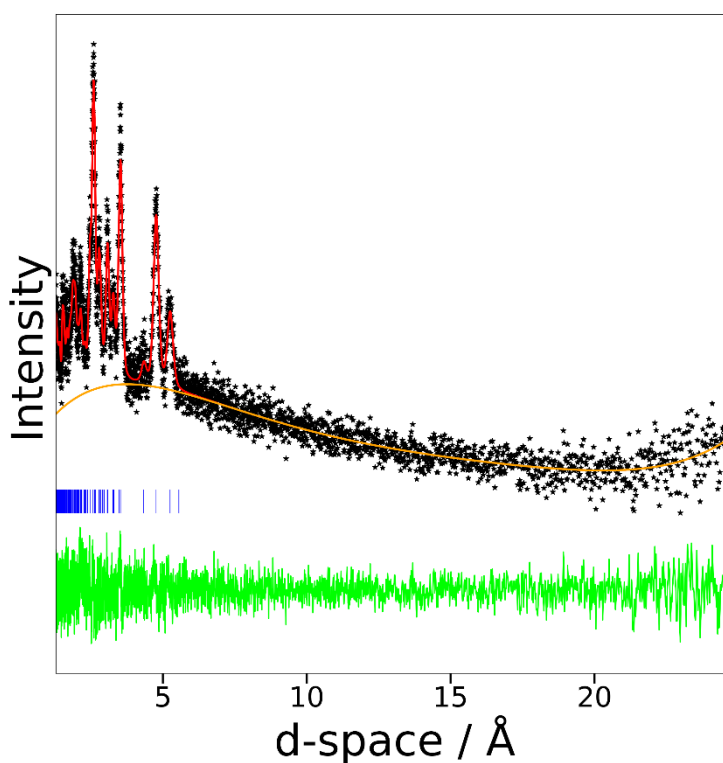

Figure S65: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 15 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.89 % and 3.19 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
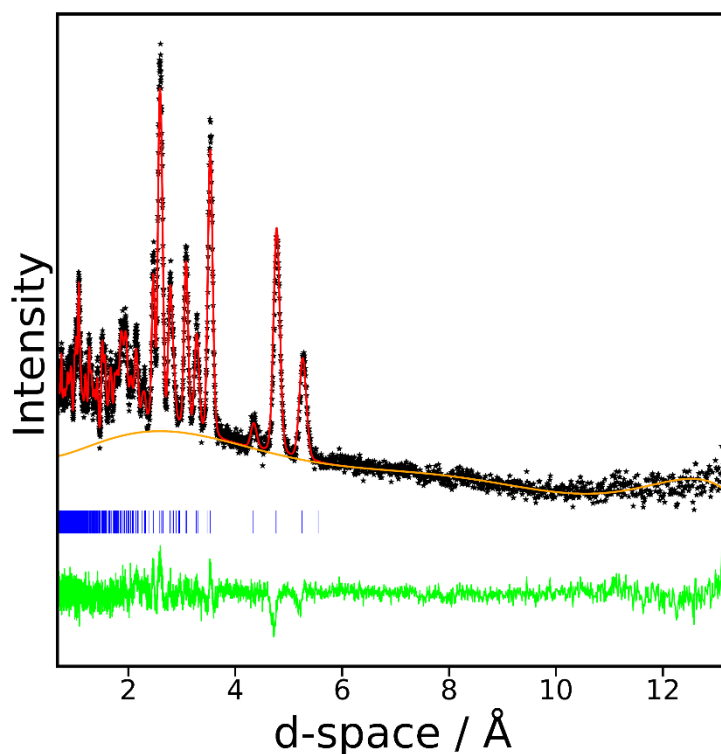
Figure S66: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 15 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.50 % and 3.19 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
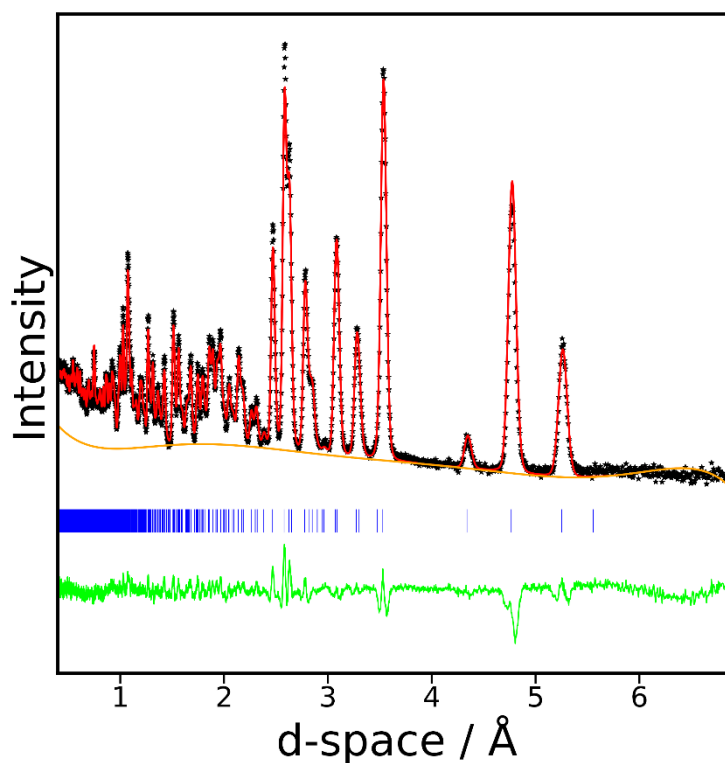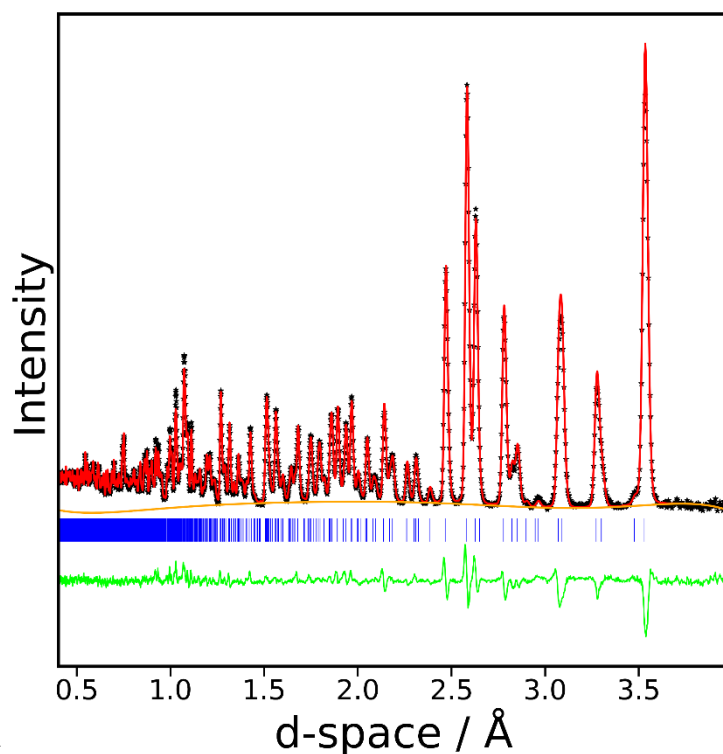

Figure S67: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 10 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.49 % and 4.04 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.

Figure S68: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 10 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.63 % and 3.12 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
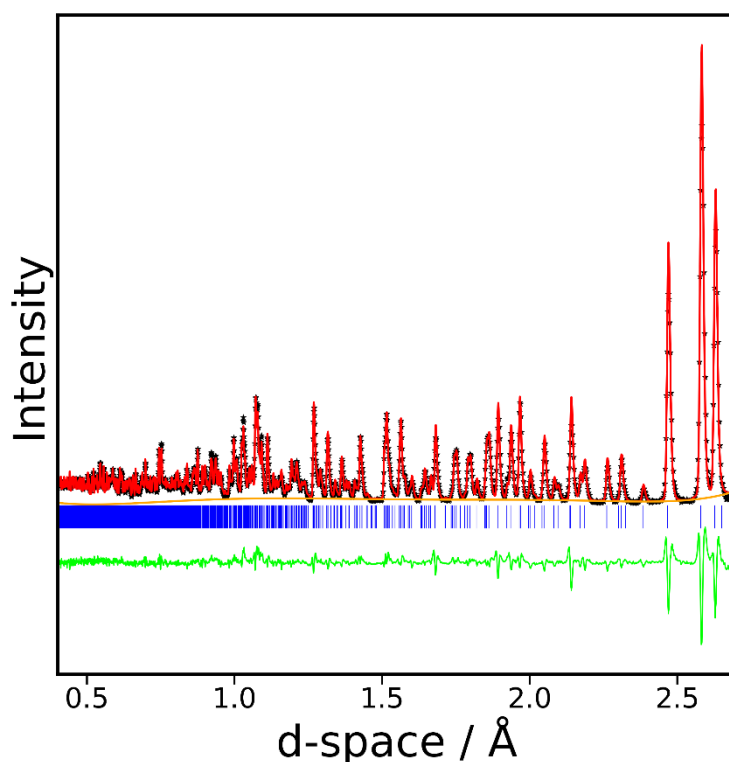

Figure S69: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 10 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.97 % and 3.20 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
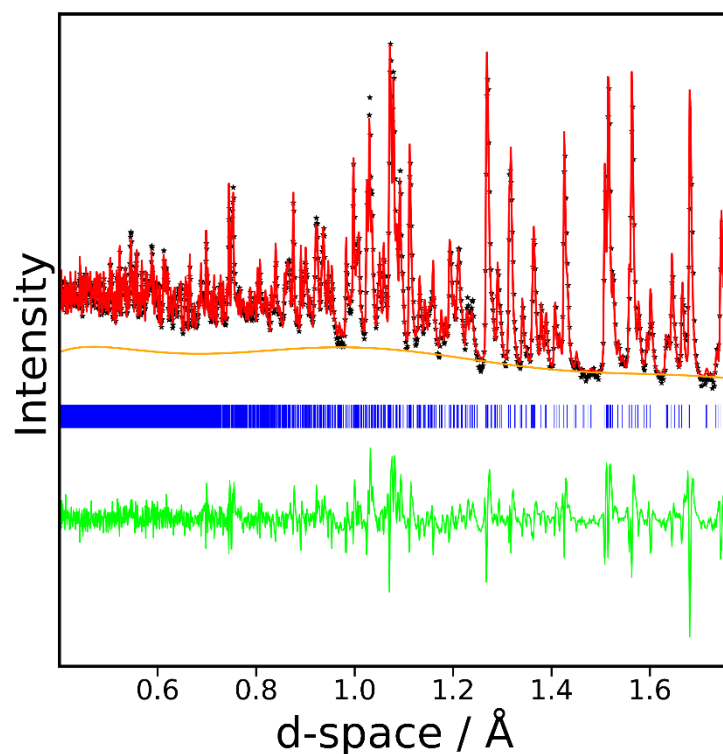
Figure S70: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 10 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 5.11 % and 5.04 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
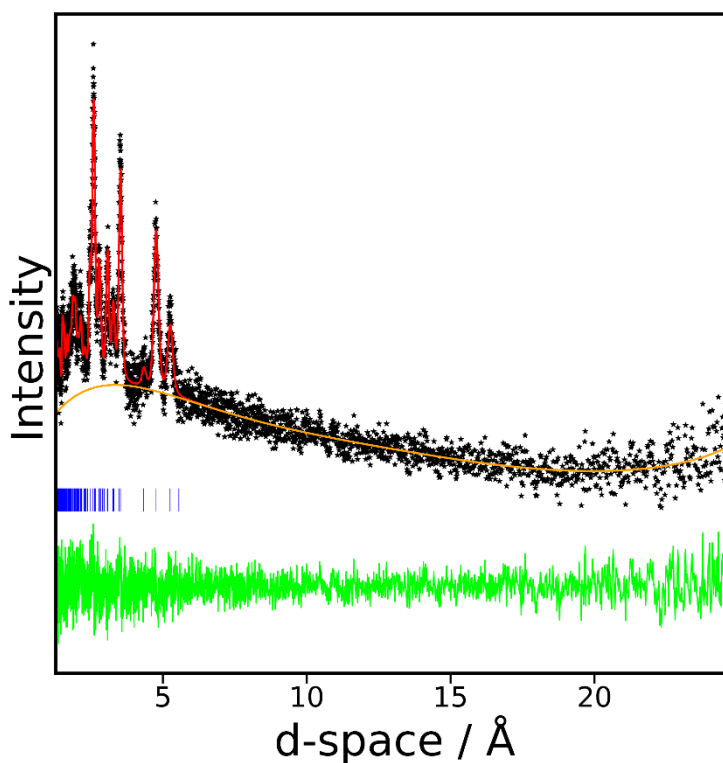

Figure S71: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 10 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.31 % and 3.57 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
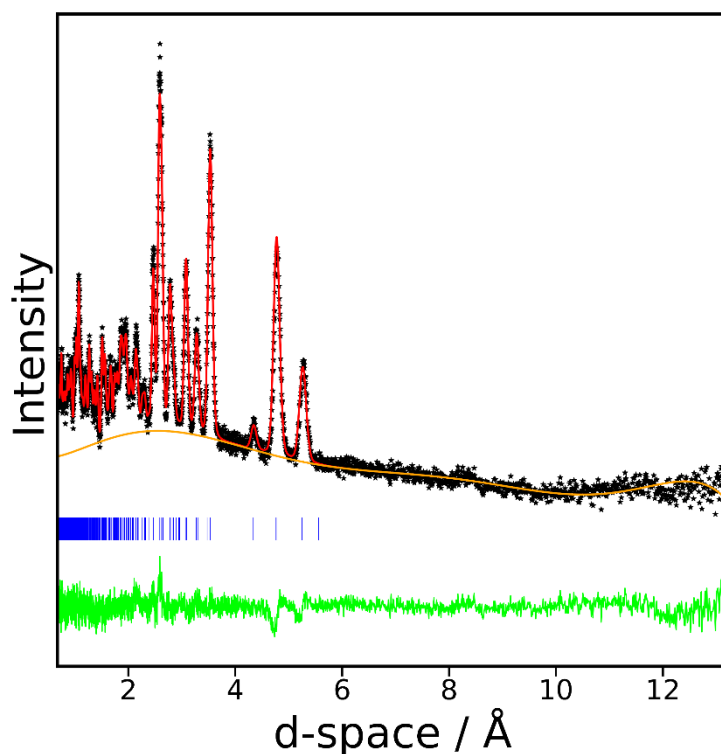
Figure S72: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 10 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.66 % and 4.59 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
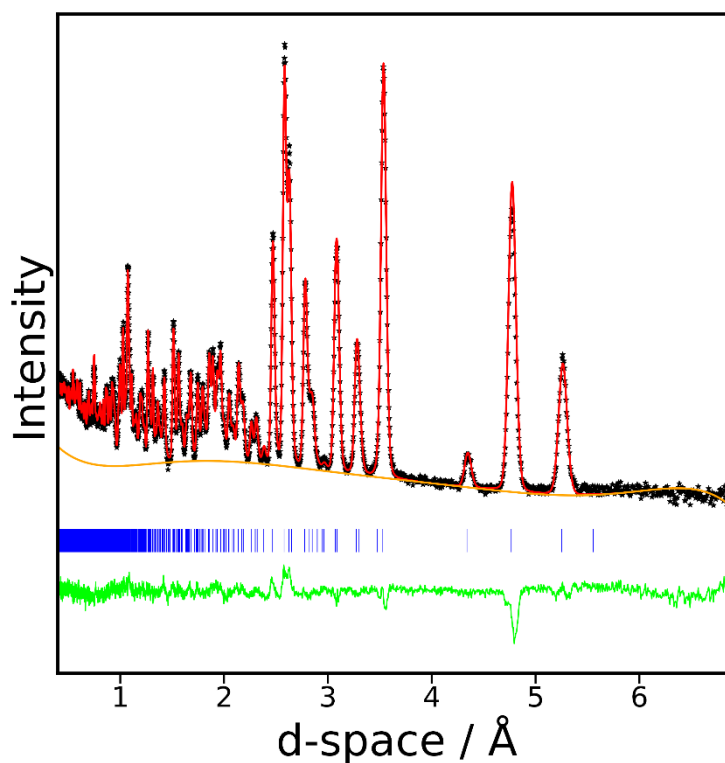

Figure S73: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 7 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.47 % and 3.88 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
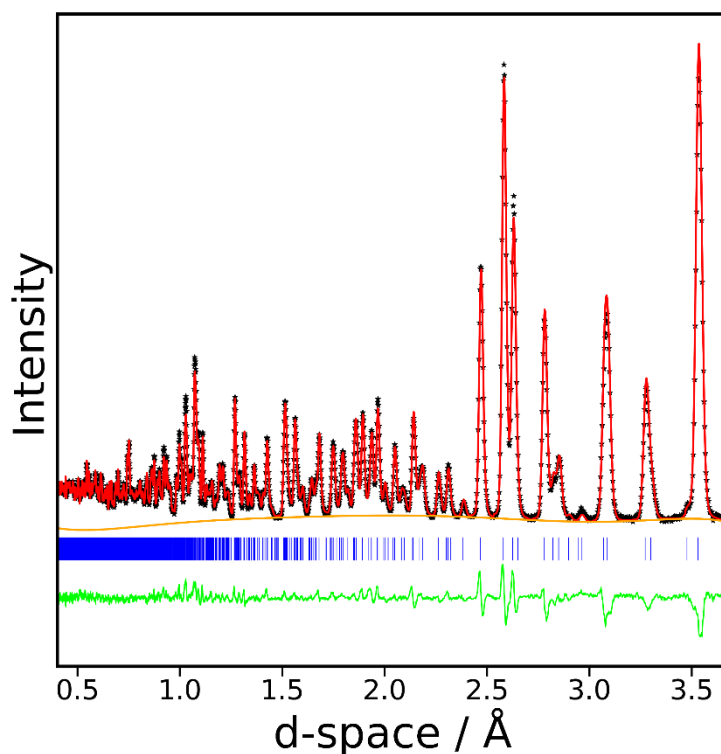
Figure S74: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 7 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.55 % and 2.87 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
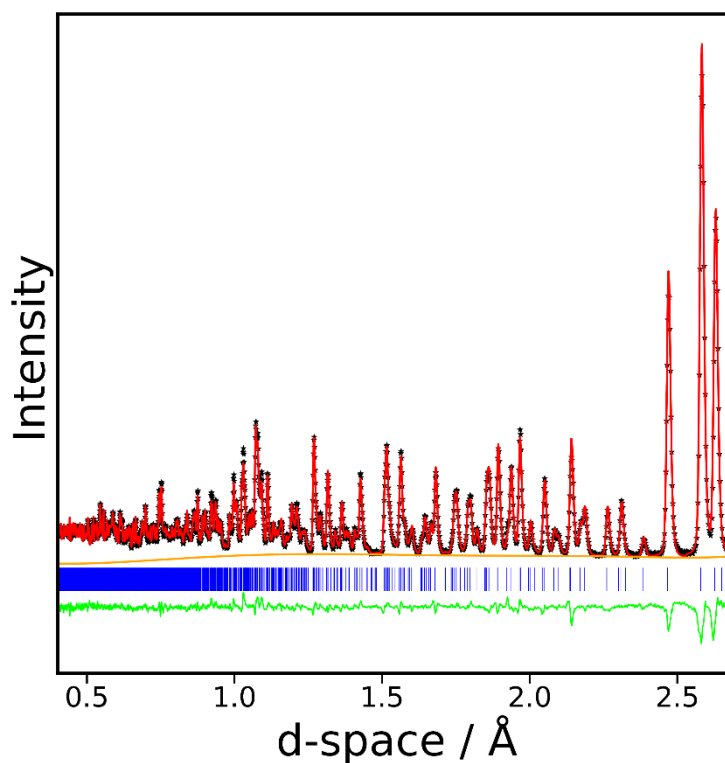

Figure S75: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 7 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.43 % and 2.63 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
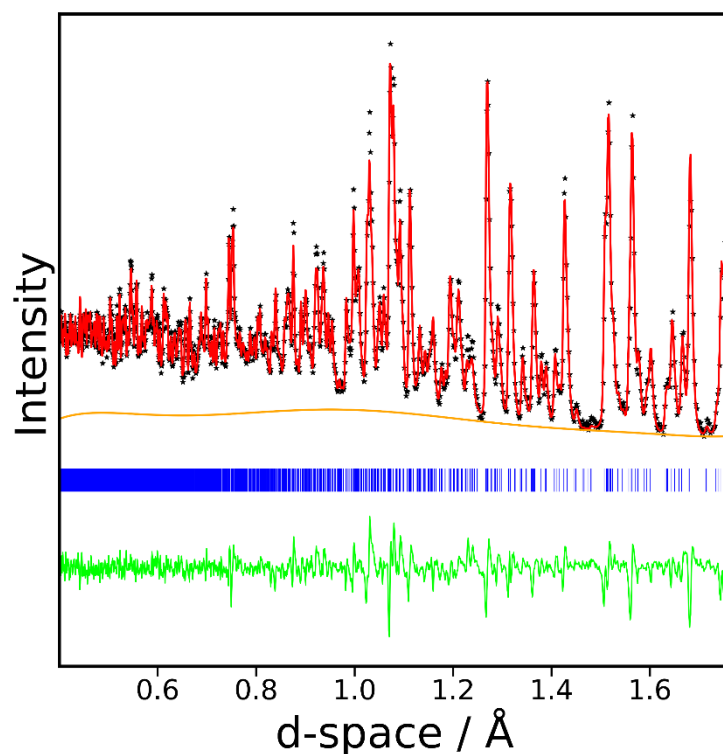
Figure S76: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 7 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.12 % and 3.38 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
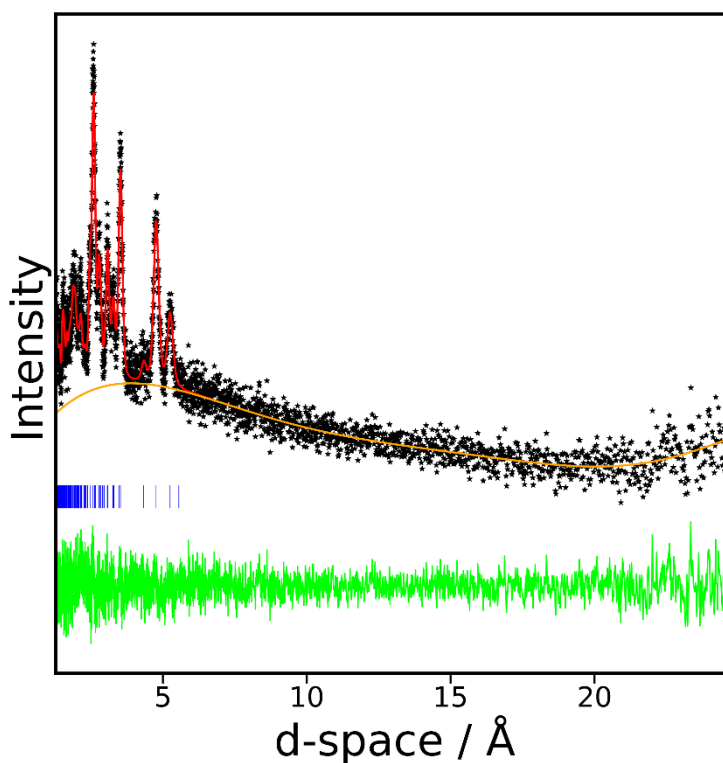

Figure S77: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 7 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.95 % and 3.20 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
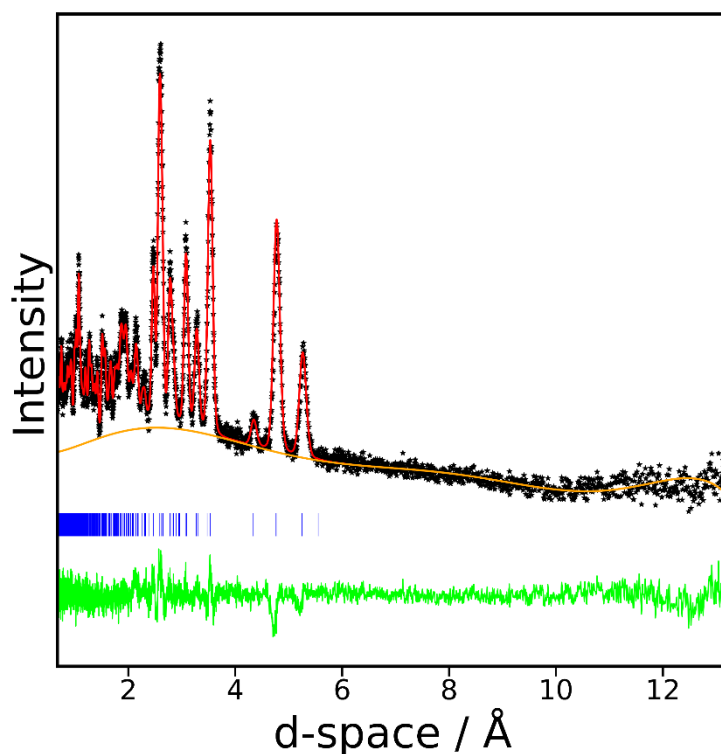
Figure S78: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 7 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.47 % and 3.16 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
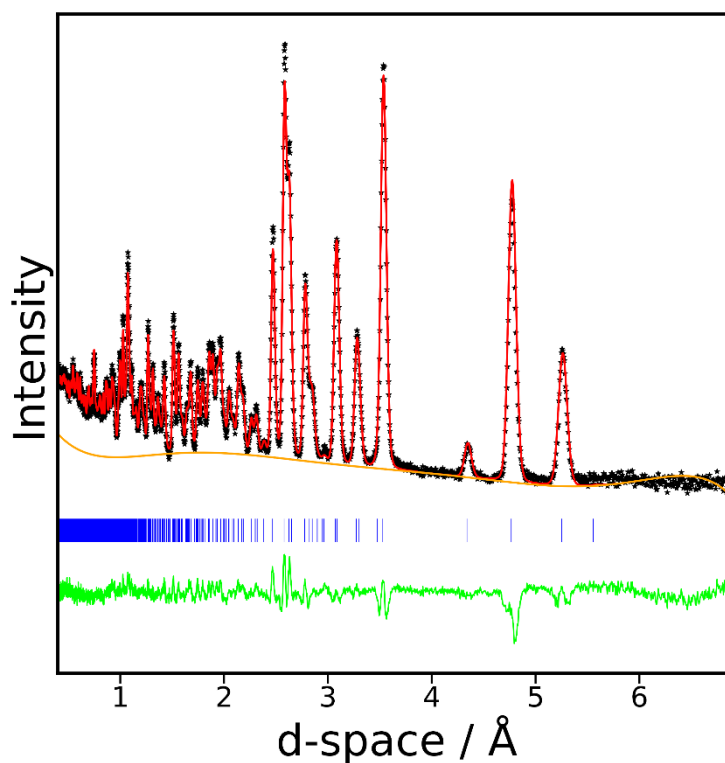

Figure S79: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 5 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.46 % and 4.04 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
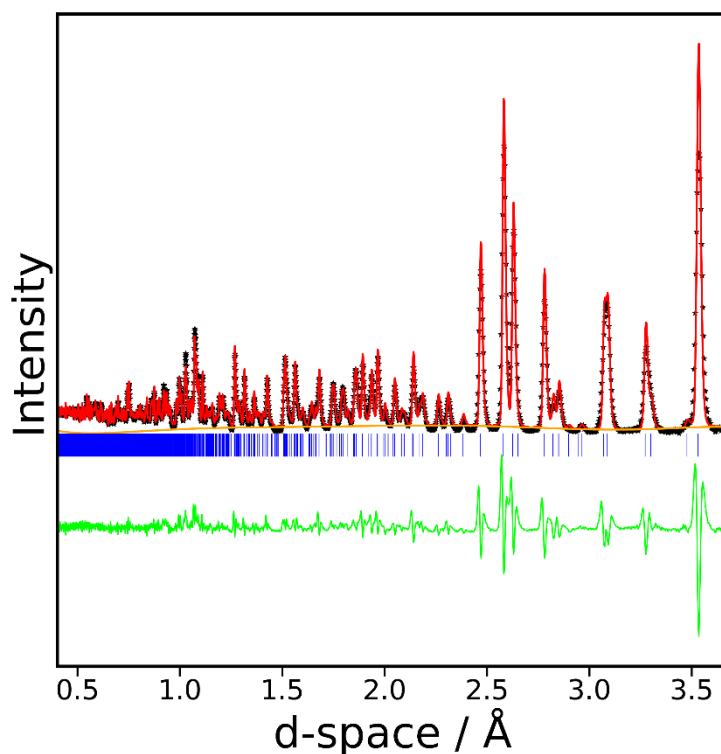
Figure S80: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 5 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.60 % and 2.87 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
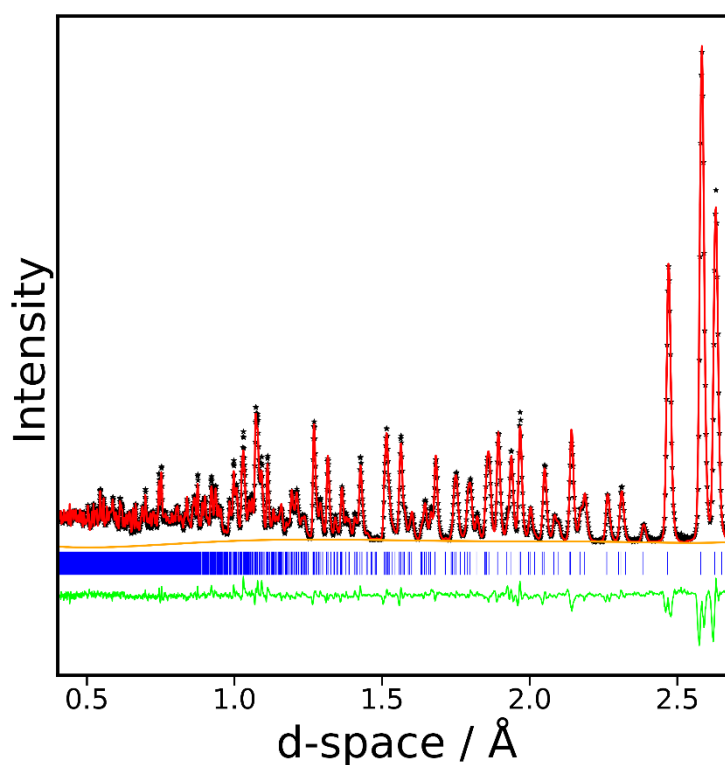

Figure S81: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 5 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.42 % and 2.62 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
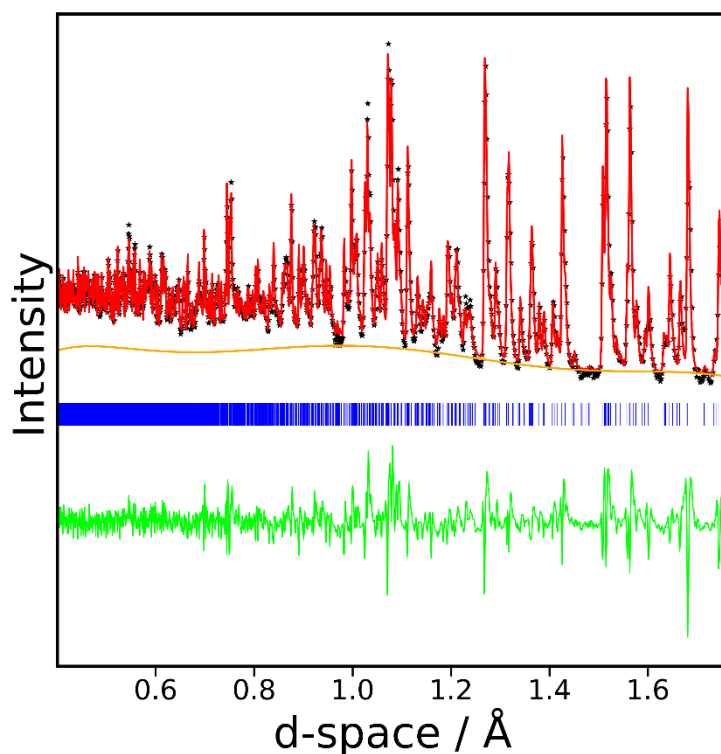
Figure S82: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 5 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.14 % and 3.40 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
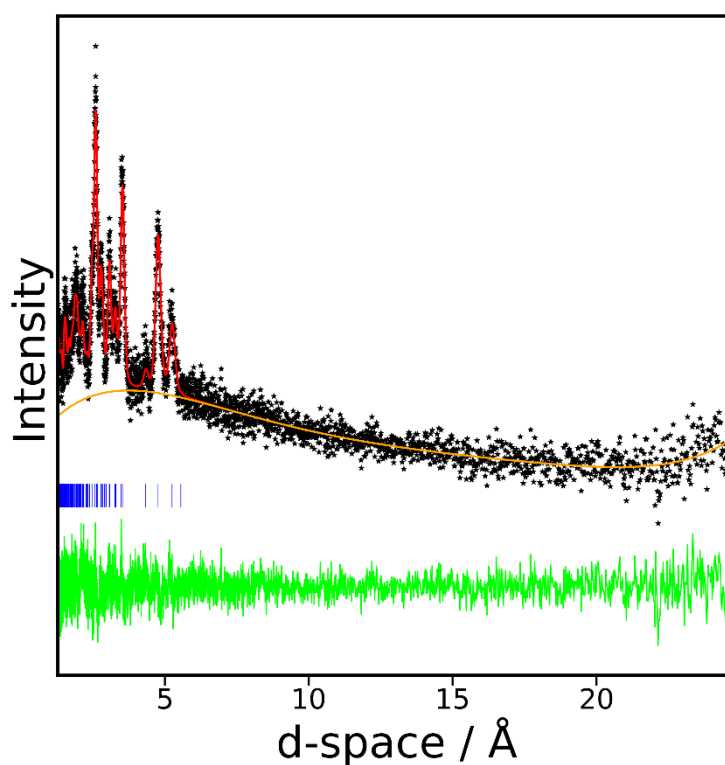

Figure S83: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 5 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.98 % and 3.28 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
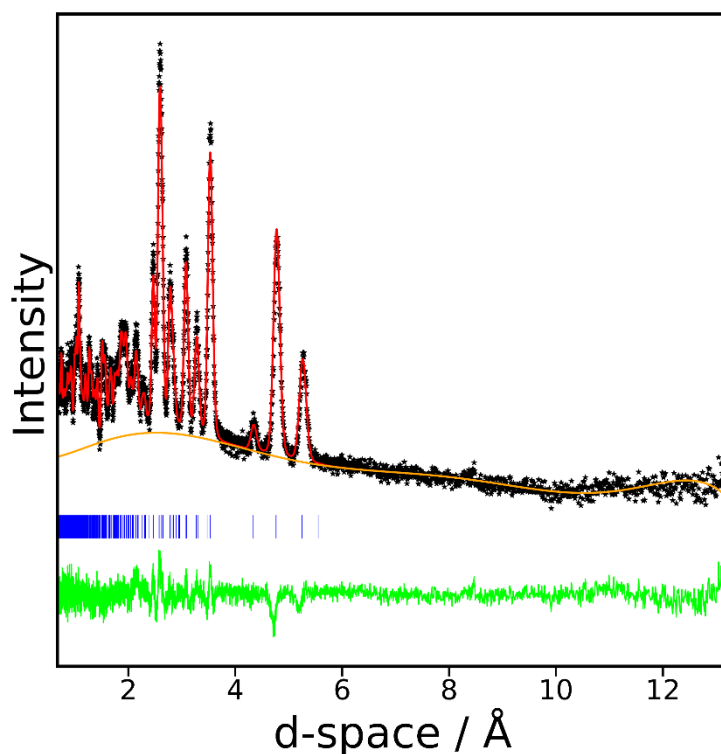
Figure S84: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 5 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 2.52 % and 3.19 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
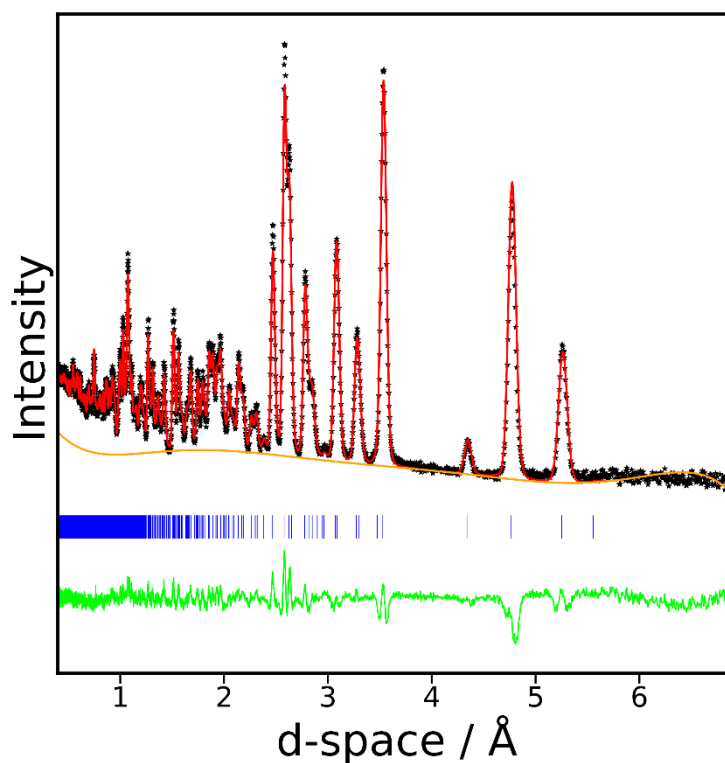

Figure S85: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 3 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 3.50 % and 4.01 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
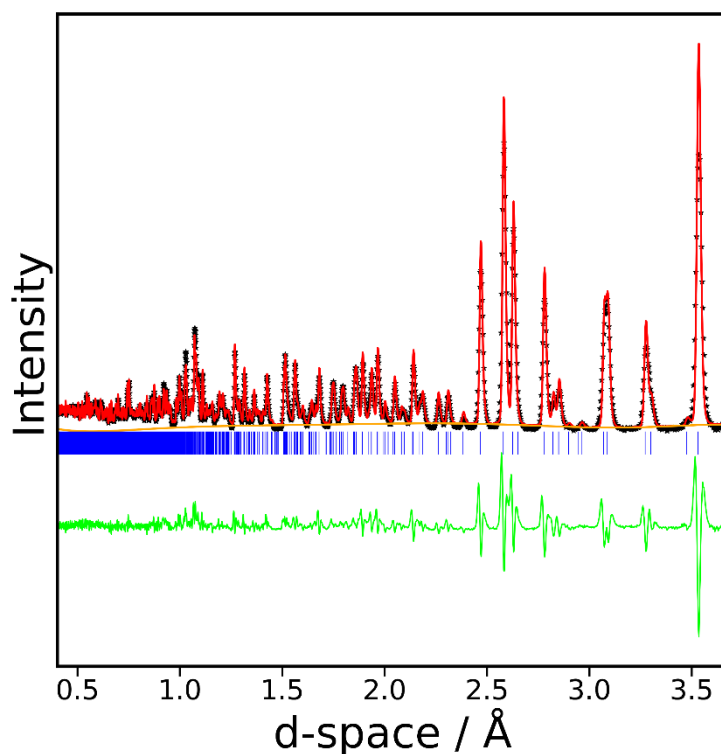
Figure S86: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 3 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 2.41 % and 2.82 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
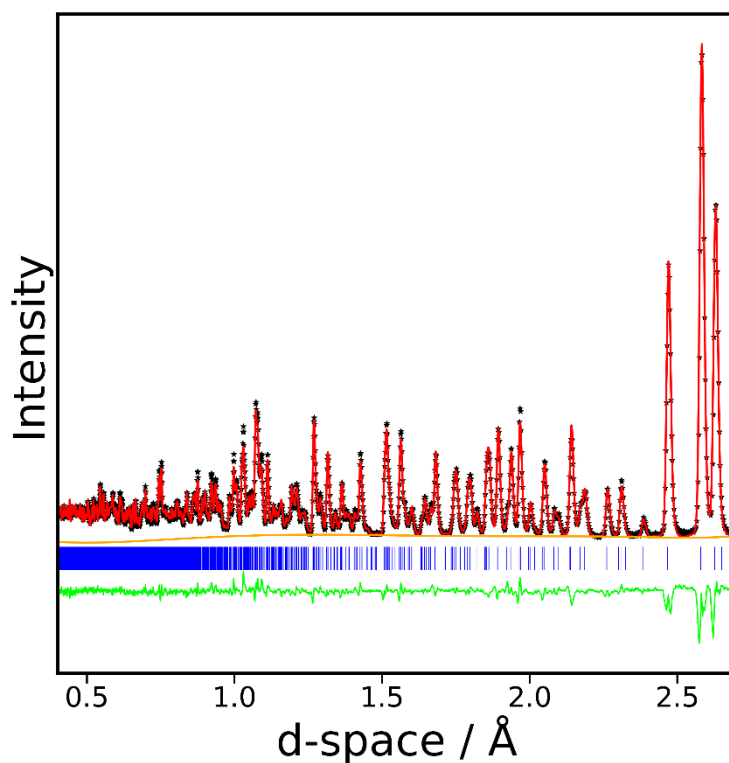

Figure S87: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 3 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 2.6 % and 2.66 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
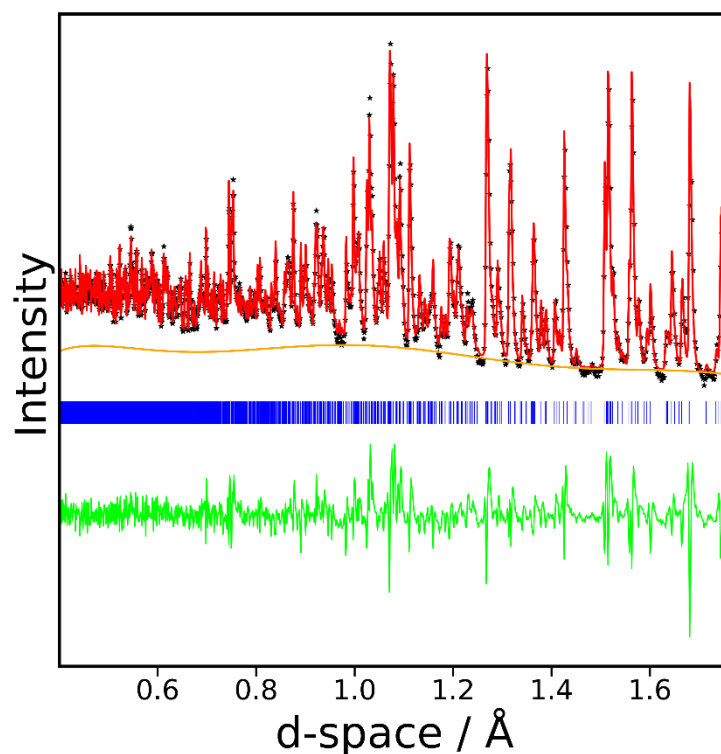
Figure S88: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 3 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.46 % and 2.66 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
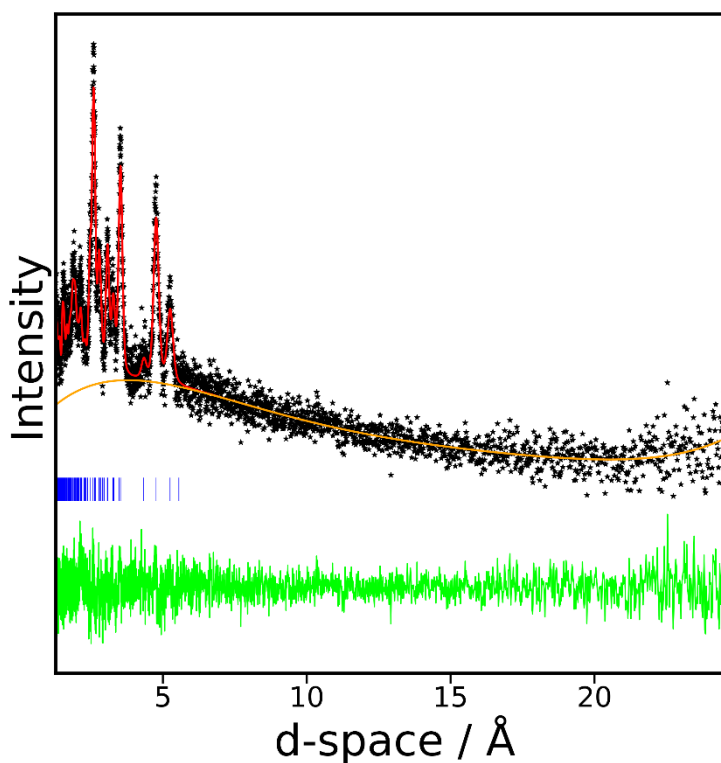

Figure S89: Neutron diffraction pattern collected from $Ho(DCO_2)(C_2O_4)$ at 3 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.00 % and 3.32 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
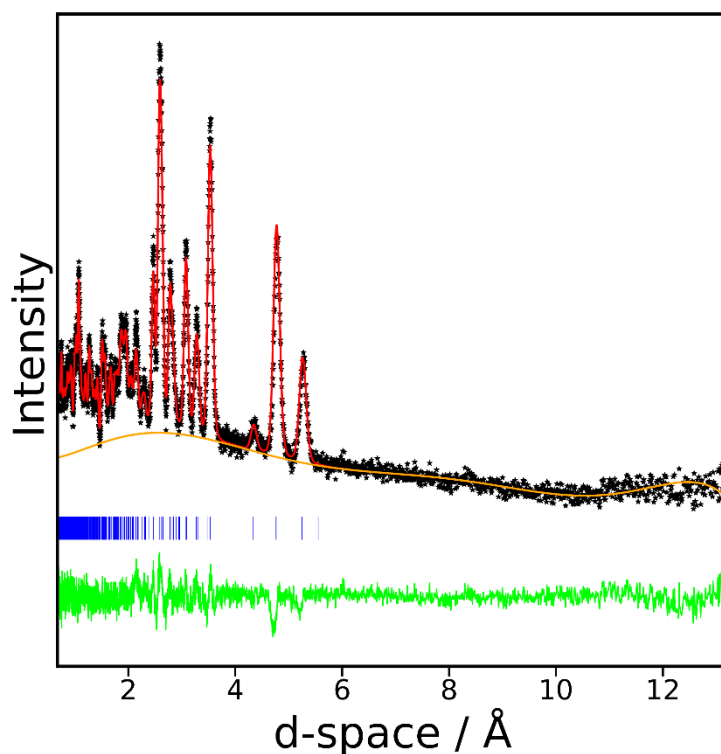
Figure S90: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 3 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.55 % and 3.26 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
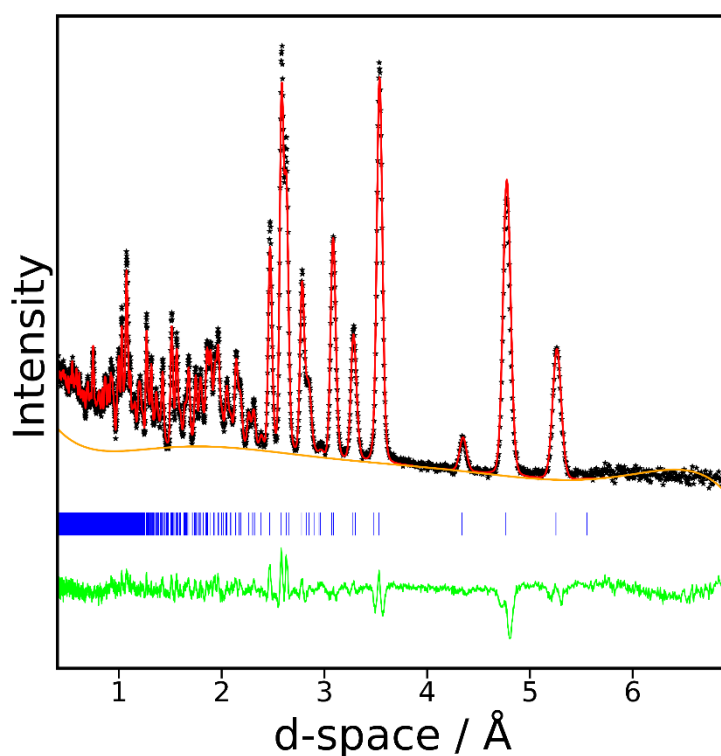

Figure S91: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 2.5 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.49 % and 3.93 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
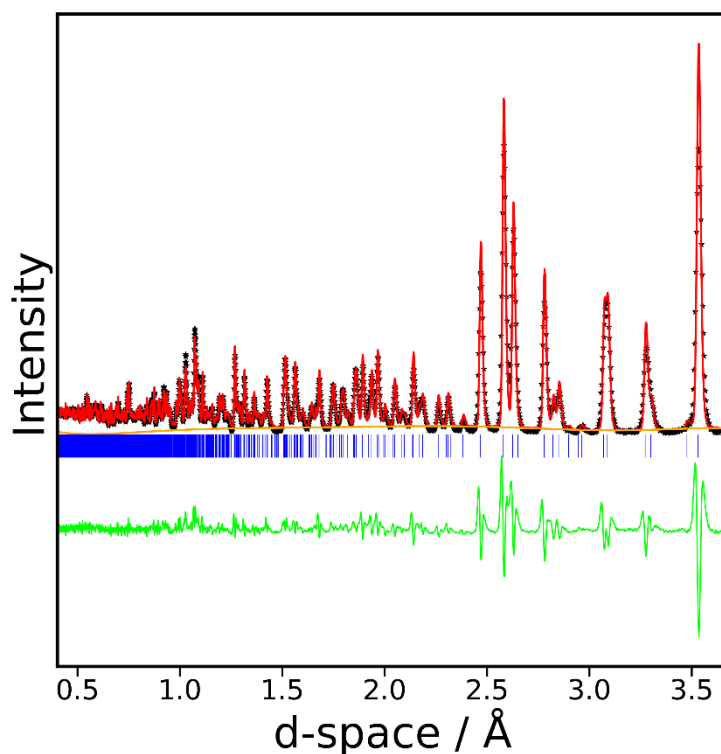
Figure S92: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 2.5 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.42 % and 2.81 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
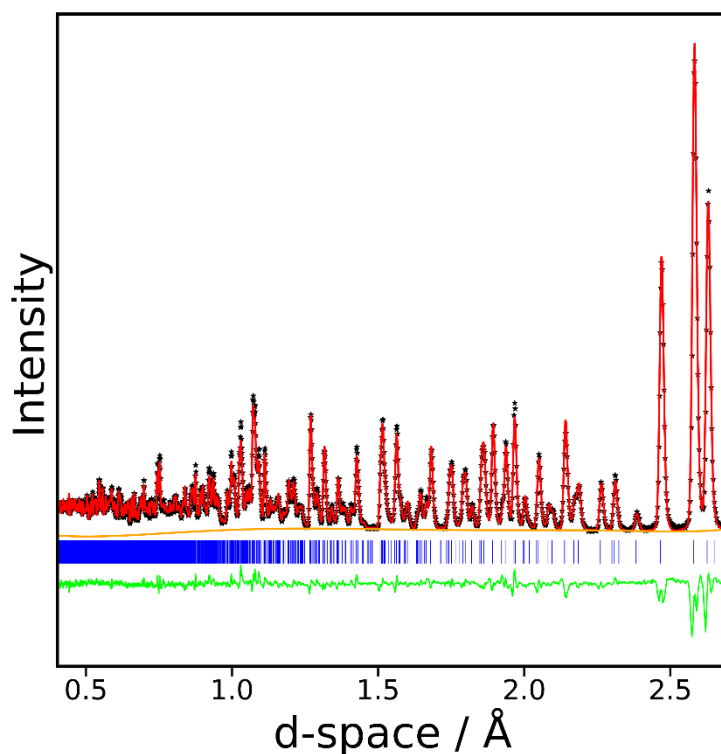

Figure S93: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 2.5 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.44 % and 2.65 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.
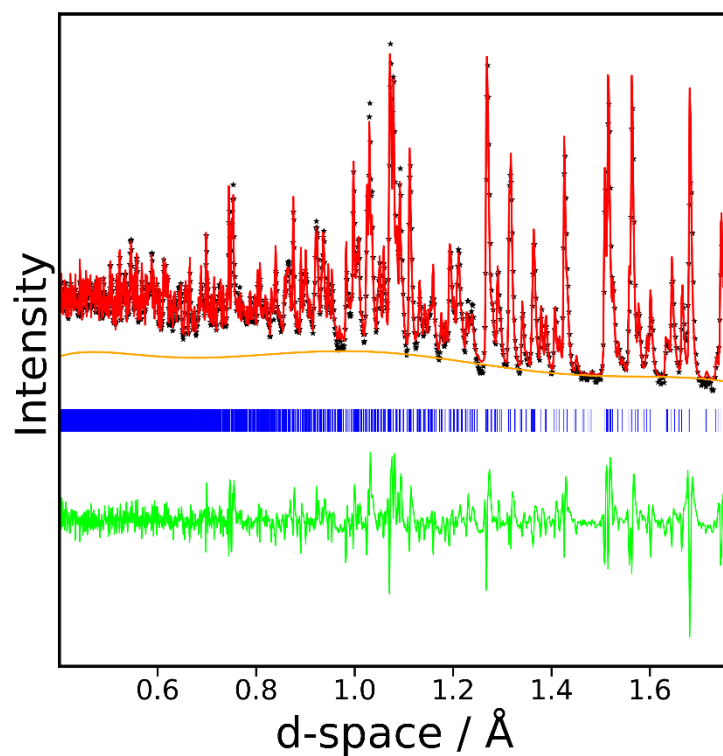
Figure S94: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 2.5 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.11 % and 3.39 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.

Figure S95: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 2.5 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.99 % and 3.24 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.

Figure S96: Neutron diffraction pattern collected from Ho(DCO$_2$)(C$_2$O$_4$) at 2.5 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.48 % and 3.18 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. The markers indicate the reflection allowed by the structure.

Neutron diffraction patterns and Rietveld refinements for Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$]
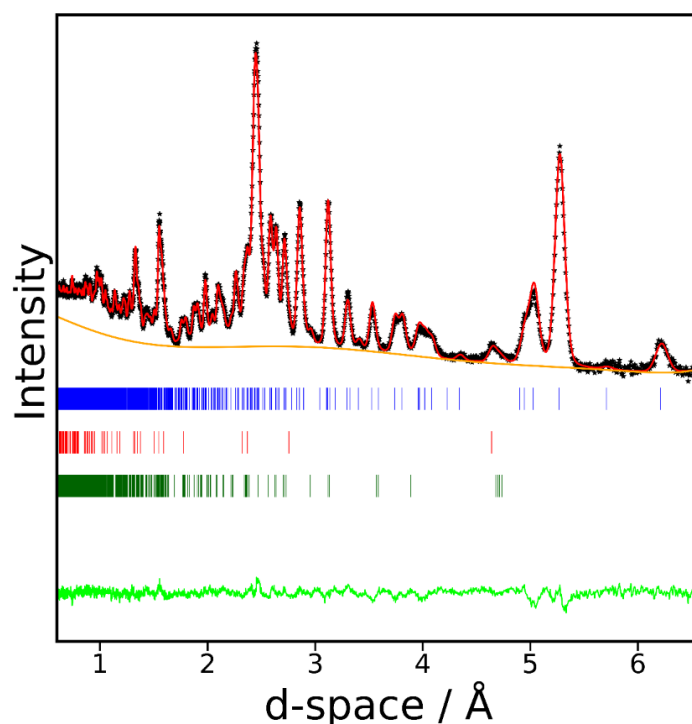
Figure S97: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at room temperature using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.01 % and 2.11 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$ and D$_2$O phases, respectively.
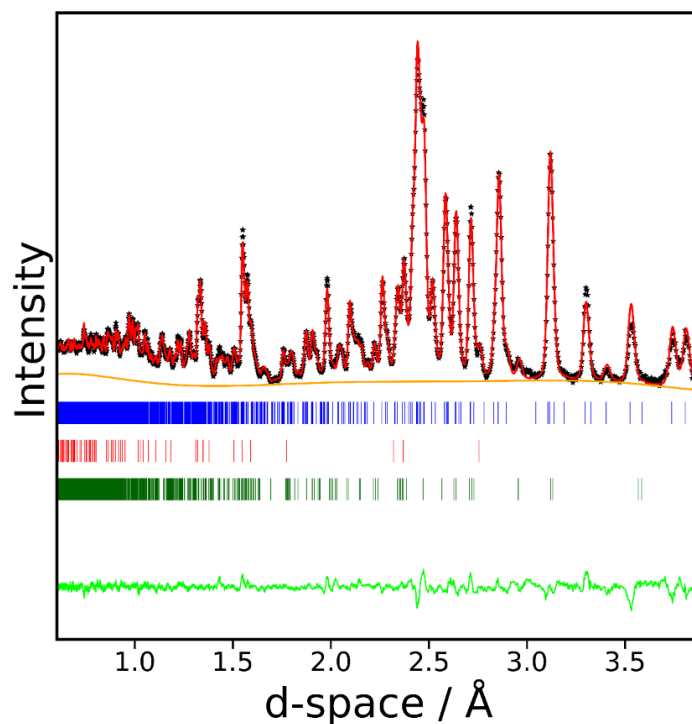
Figure S98: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at room temperature using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.39 % and 2.47 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$ and D$_2$O phases, respectively.
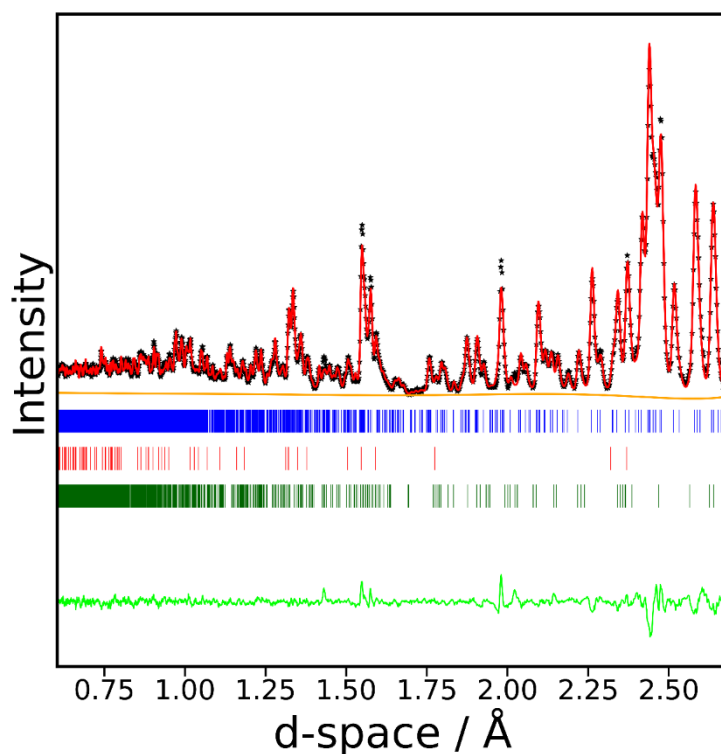
Figure S99: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at room temperature using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.52 % and 2.66 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
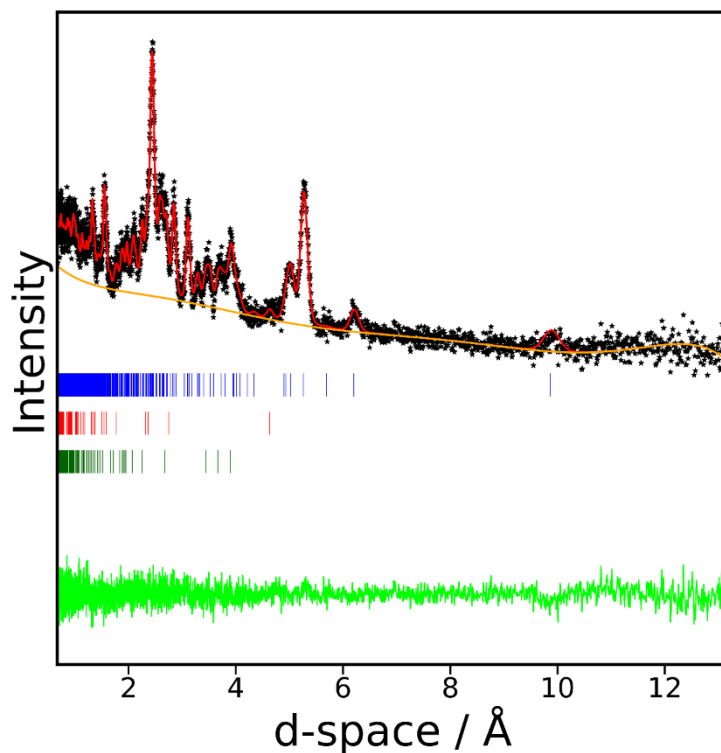
Figure S100: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 199 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of   % and %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
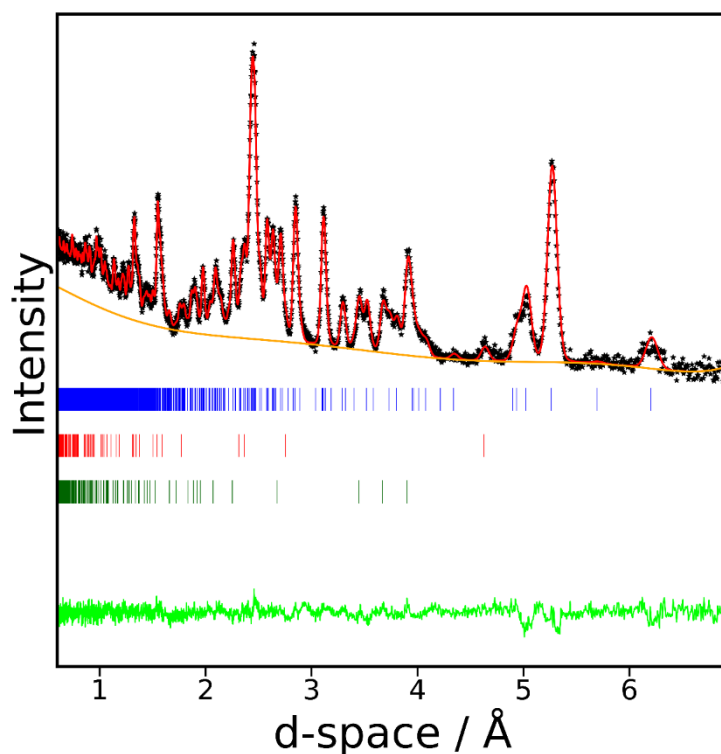
Figure S101: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 199 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.56 % and 2.46 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
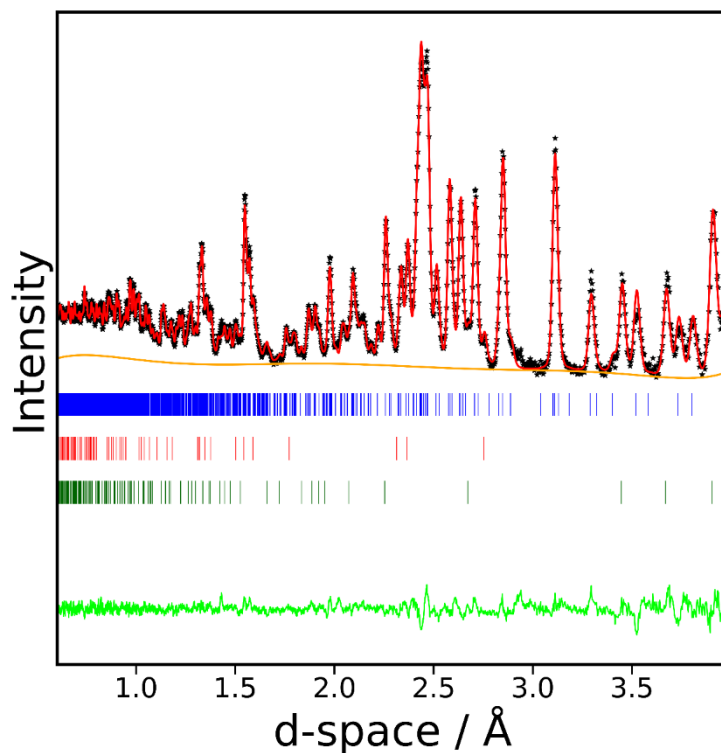
Figure S102: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 199 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.55 % and 2.54 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
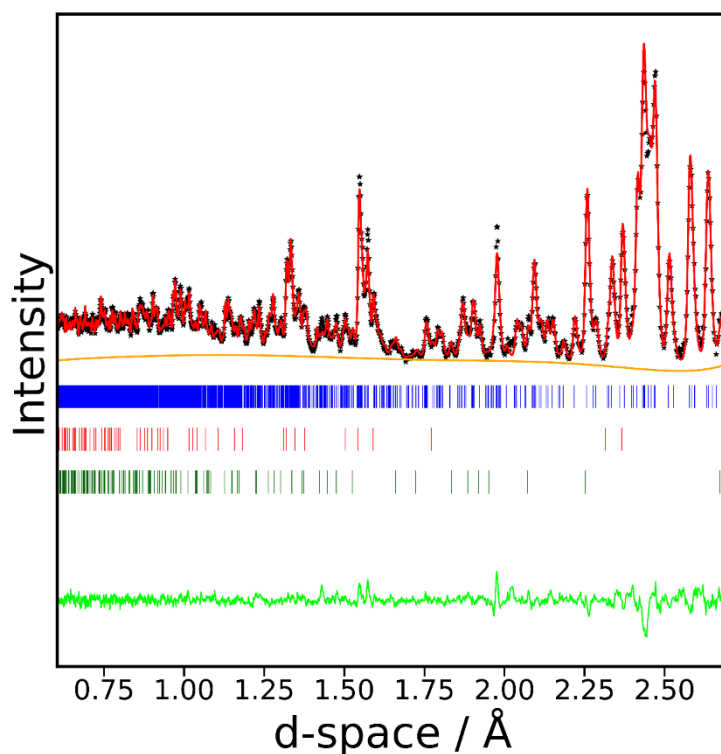
Figure S103: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 199 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.61 % and 2.89 %, respectively. The crosses, upper and lower lines indicate the observed and calculated intensities and the differences between them. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
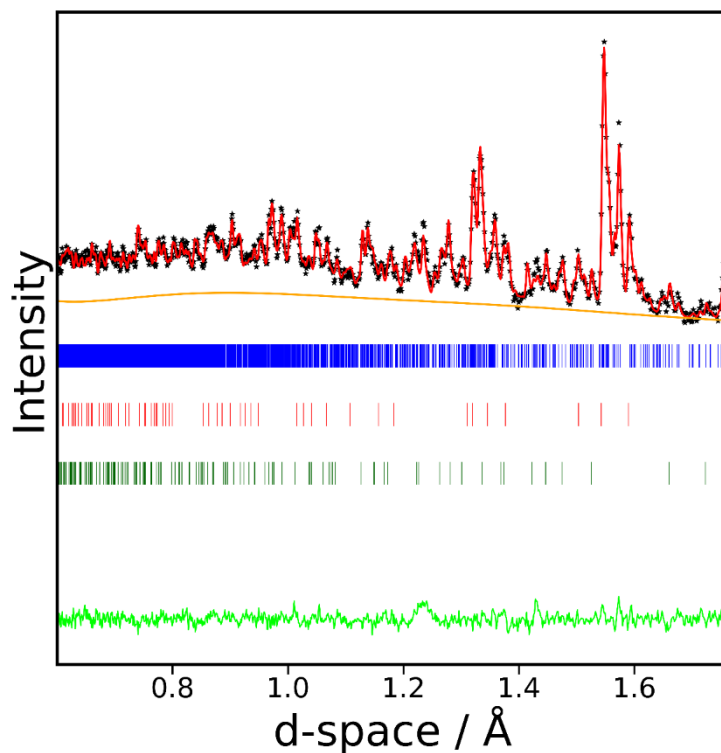
Figure S104: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 199 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.68 % and 2.03 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
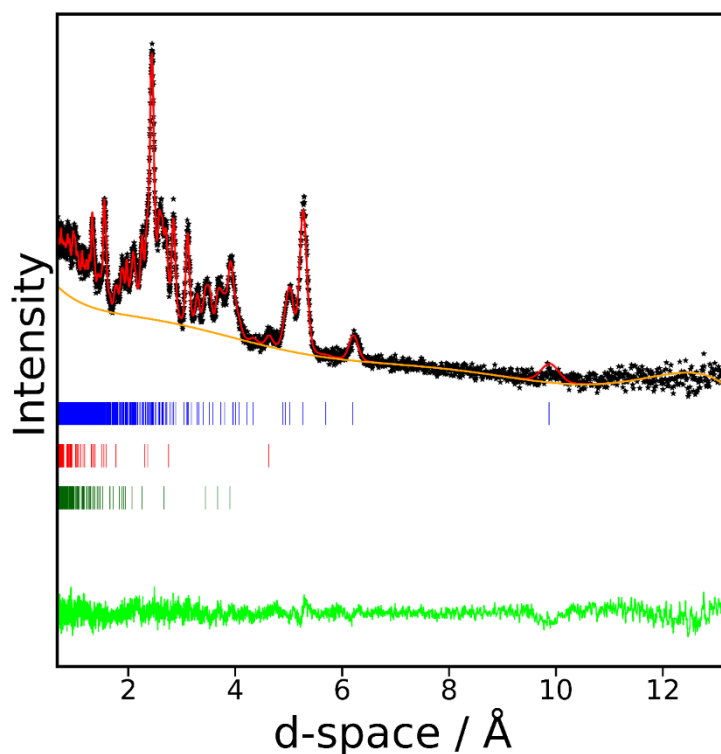
Figure S105: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 195 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.24 % and 2.34 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
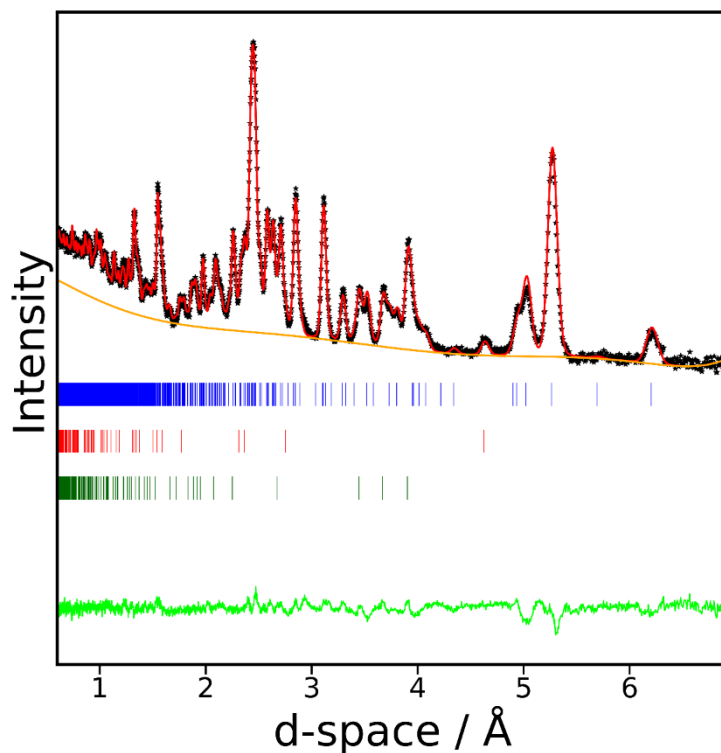
Figure S106: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 195 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.04 % and 2.11 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
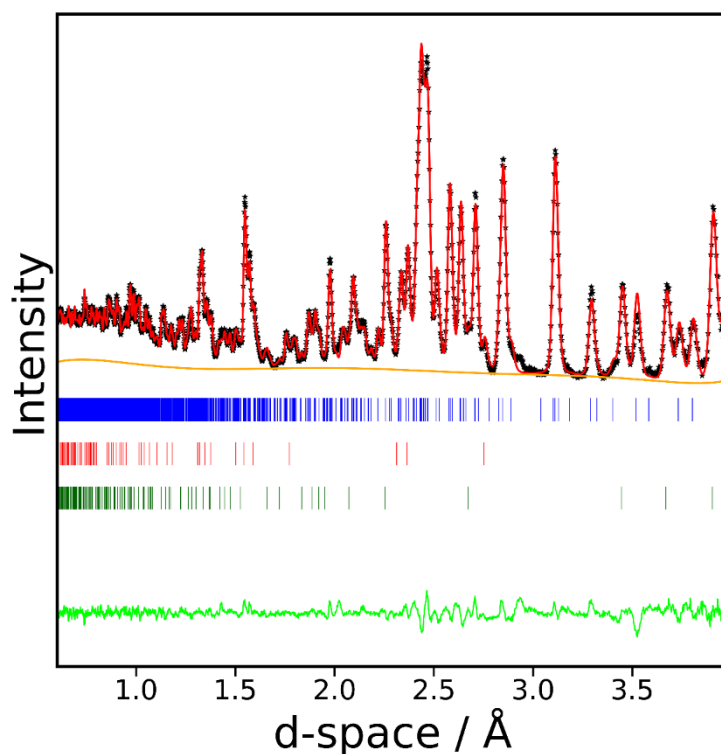
Figure S107: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 195 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.15 % and 2.26 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
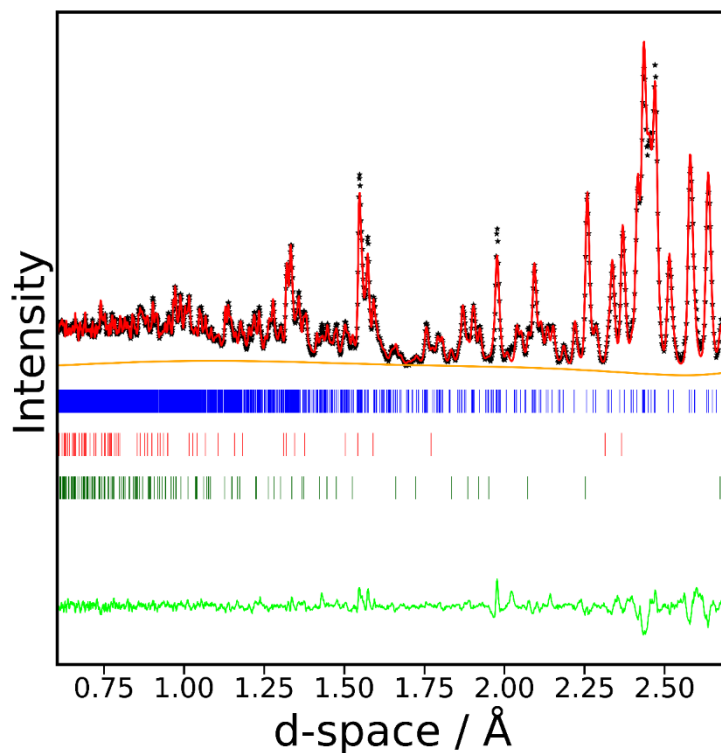
Figure S108: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 195 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.36 % and 2.54 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
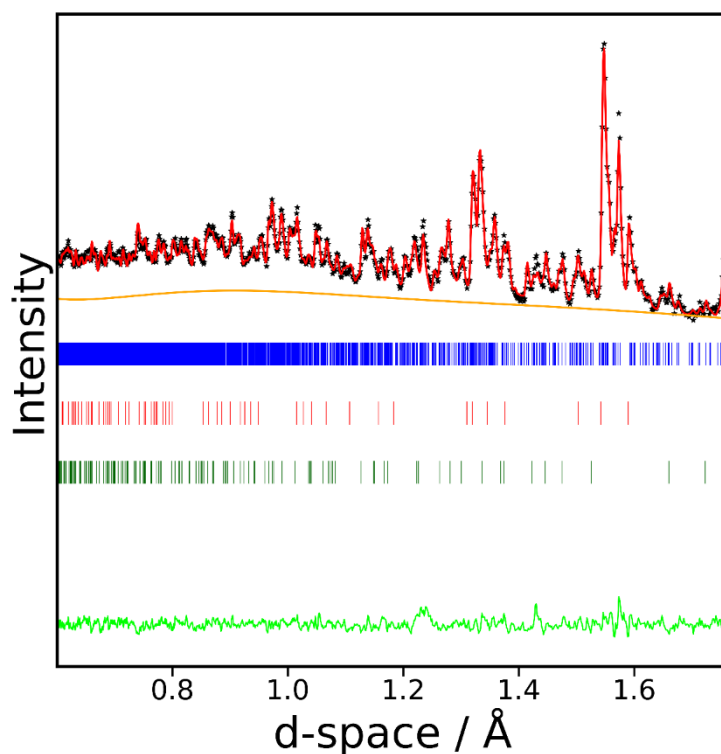
Figure S109: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 195 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.42 % and 1.69 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
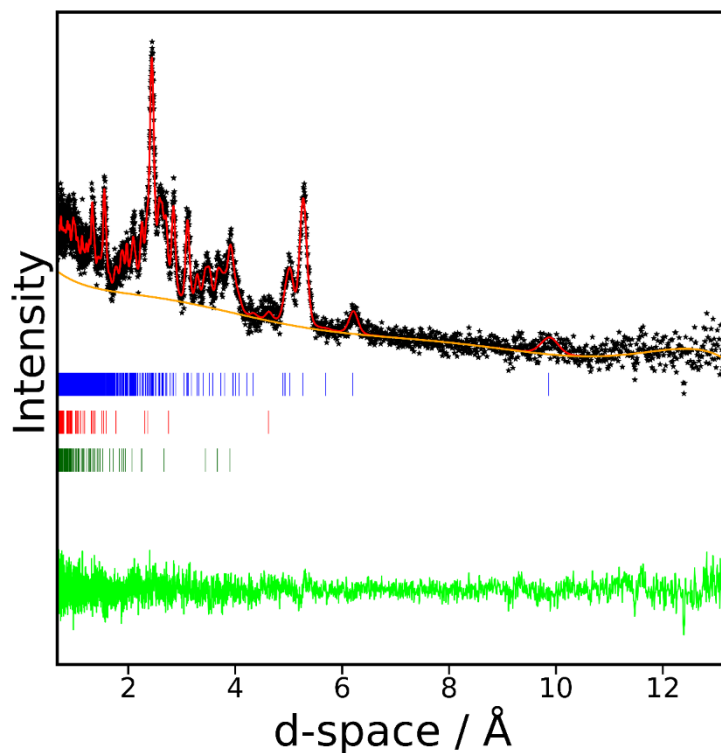
Figure S110: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 179 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.63 % and 4.08 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
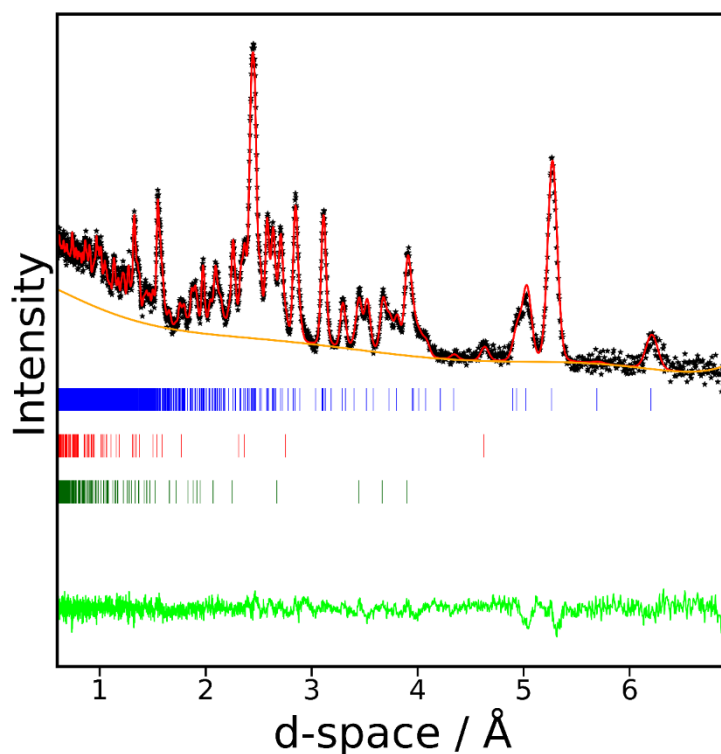
Figure S111: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 179 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.78 % and 2.86 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$ and D$_2$O phases, respectively.
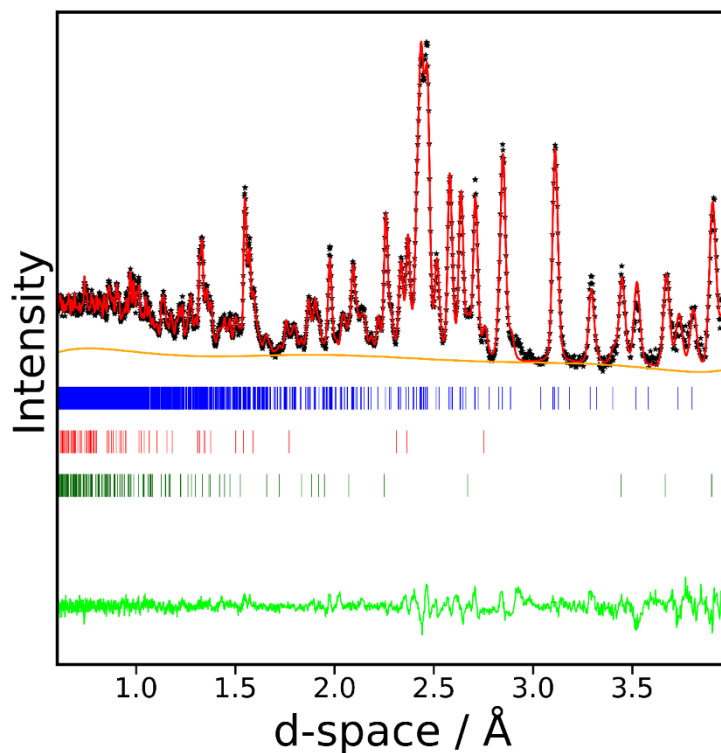
Figure S112: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 179 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.83 % and 2.81 %, respectively. The crosses, upper and lower lines indicate the observed and calculated intensities and the differences between them Blue, red and green markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$ and D$_2$O phases, respectively.
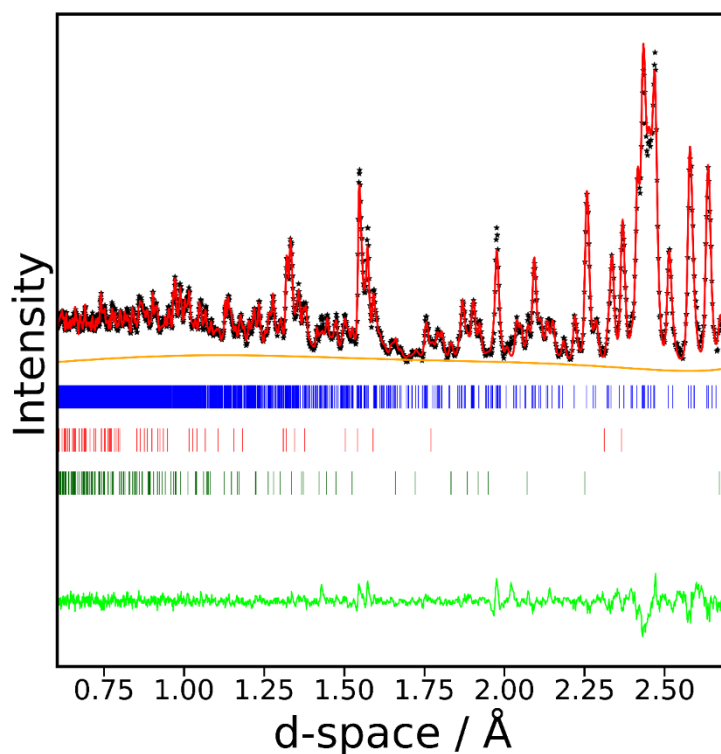
Figure S113: Neutron diffraction pattern collected from [Li(C₂O₄)]₂[Co₅(OD)₈] at 179 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.78 % and 2.98 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the [Li(C₂O₄)]₂[Co₅(OD)₈], Co(OD)₂ and D₂O phases, respectively.
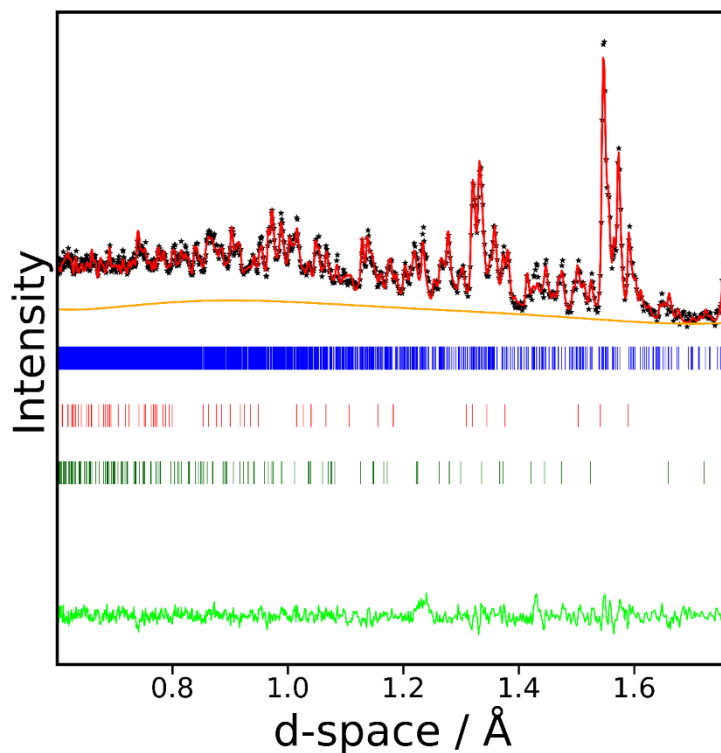
Figure S114: Neutron diffraction pattern collected from [Li(C₂O₄)]₂[Co₅(OD)₈] at 179 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.81 % and 2.12 %, respectively. The crosses, upper and lower lines indicate the observed and calculated intensities and the differences between them Blue, red and green markers represent reflections allowed by the [Li(C₂O₄)]₂[Co₅(OD)₈], Co(OD)₂ and D₂O phases, respectively.

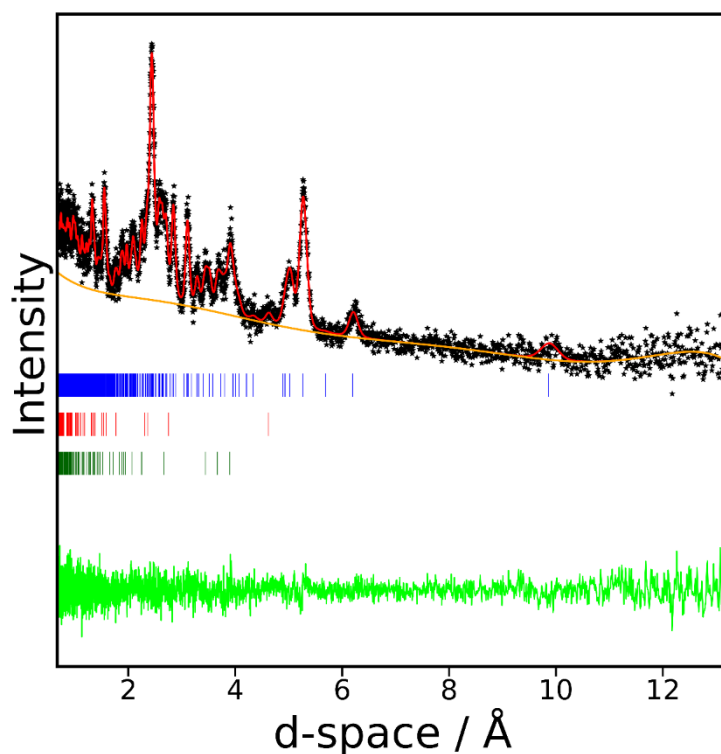**Figure S115:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 159 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.72 % and 4.12 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
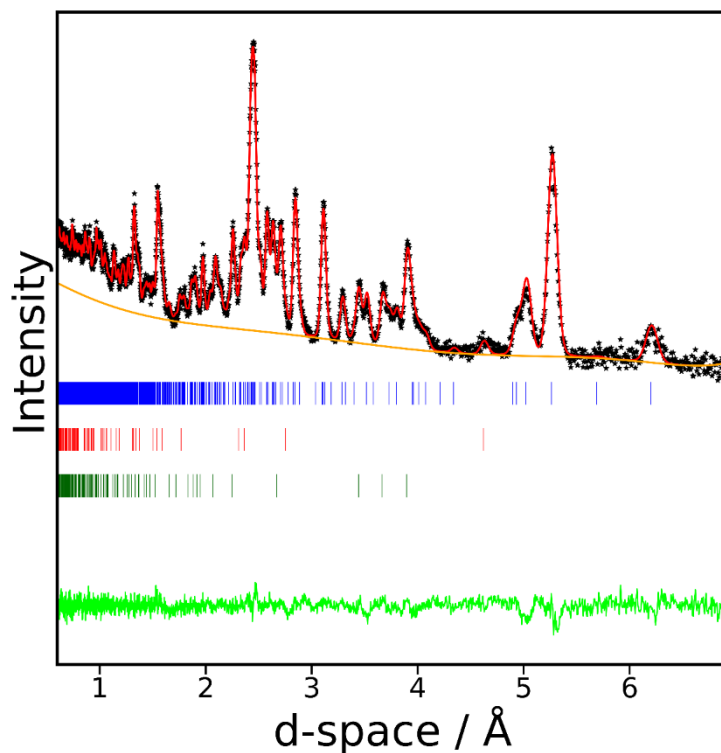
Figure S116: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 159 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.72 % and 2.83 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
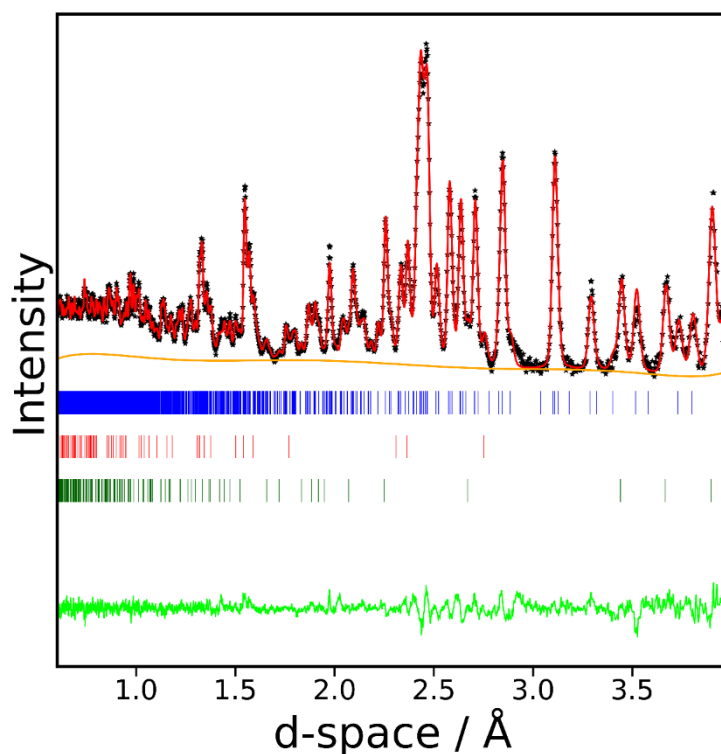
Figure S117: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 159 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.66 % and 2.79 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$ and D$_2$O phases, respectively.
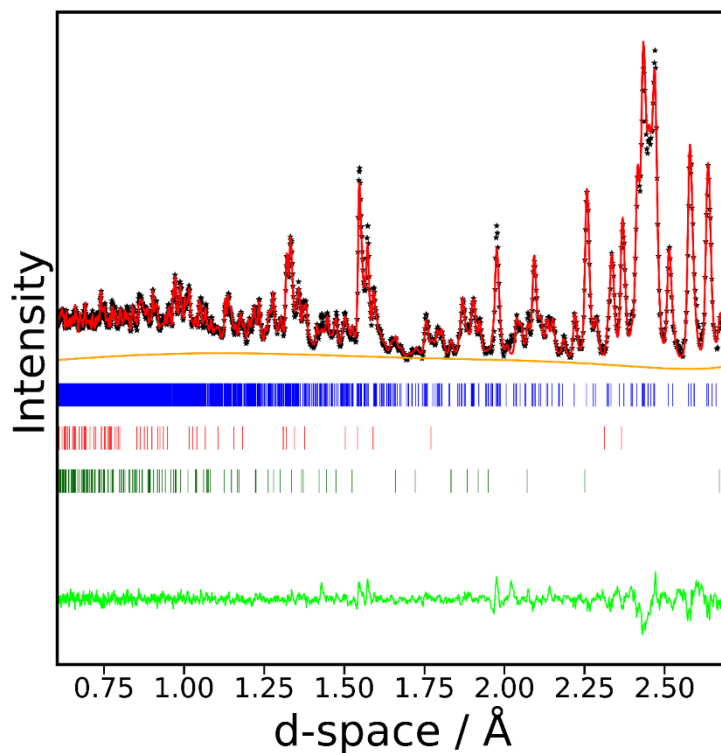
Figure S118: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 159 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.81 % and 3.02 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$ and D$_2$O phases, respectively.

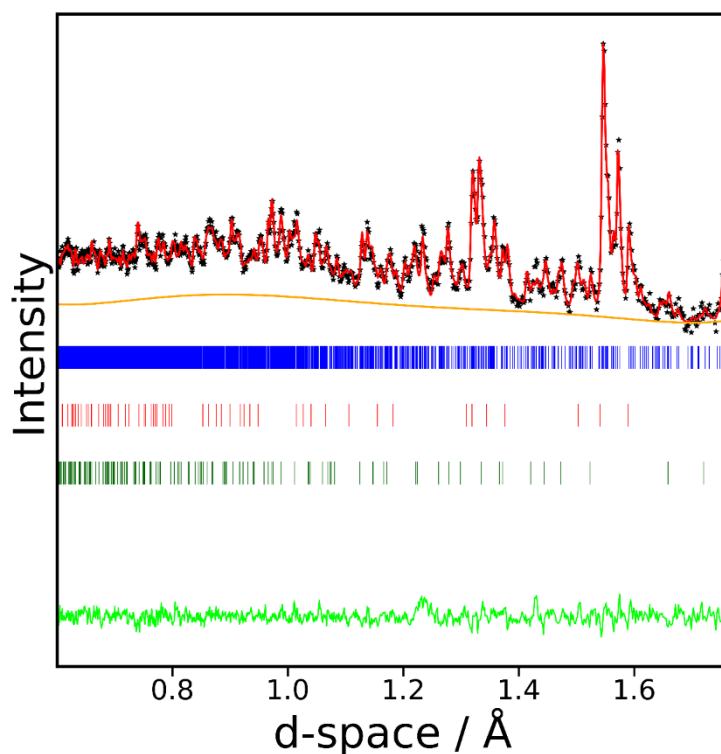**Figure S119:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 159 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.88 % and 2.21 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
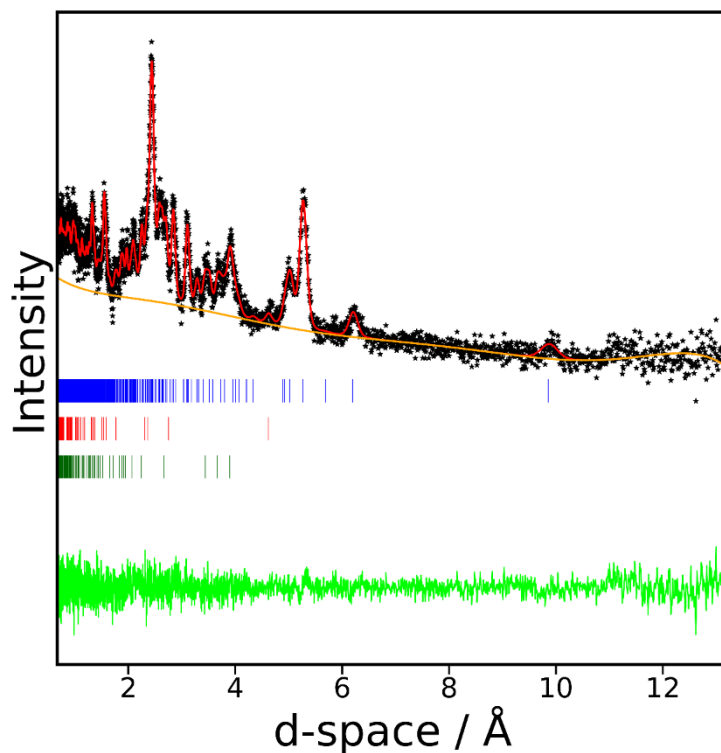
Figure S120: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 140 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.56 % and 4.08 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
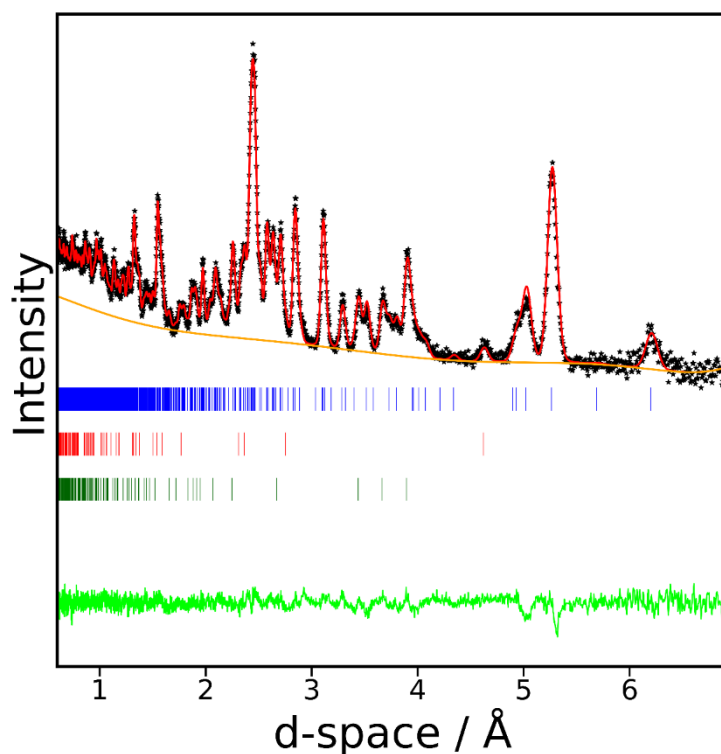
Figure S121: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 140 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.80 % and 2.88 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
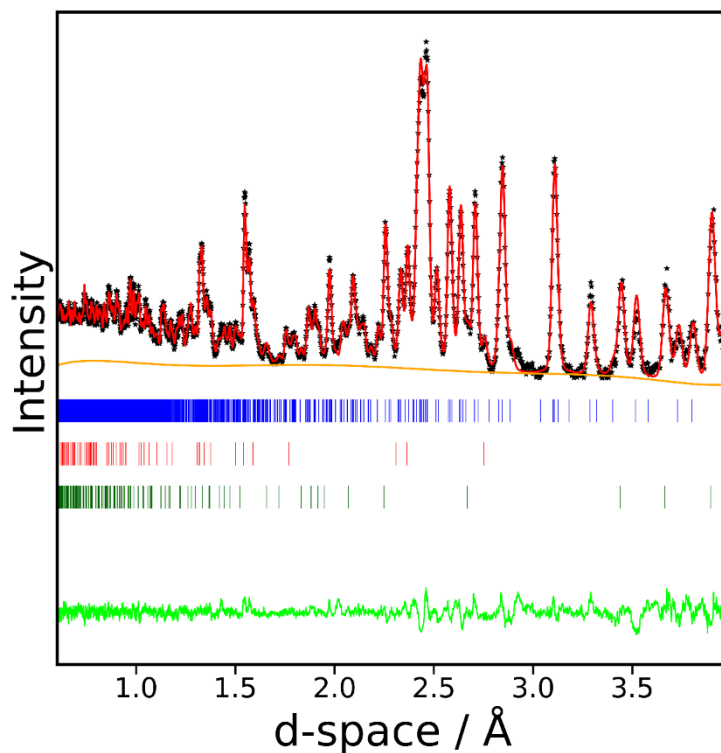
Figure S122: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 140 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.83 % and 2.88 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
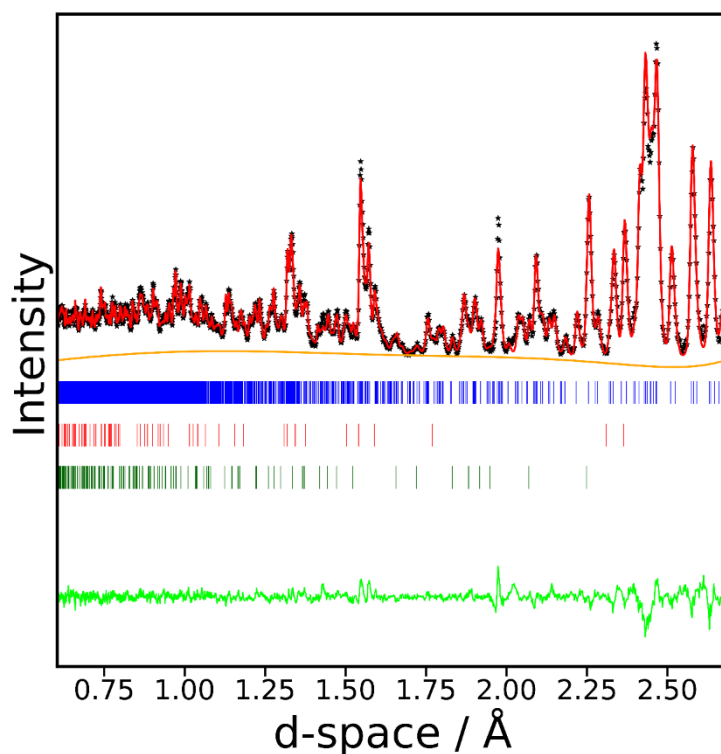
Figure S123: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 140 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.71 % and 2.94 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
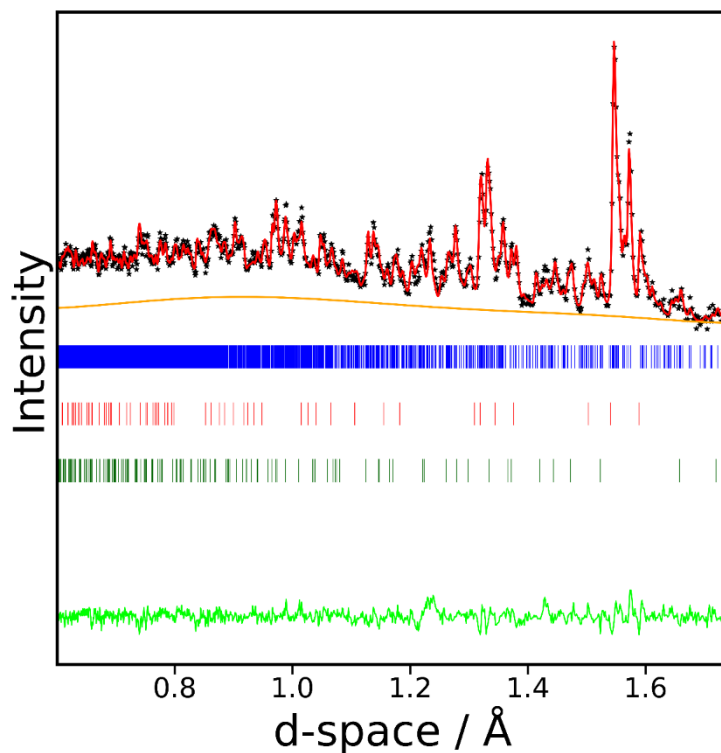
Figure S124: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 140 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.80 % and 2.20 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
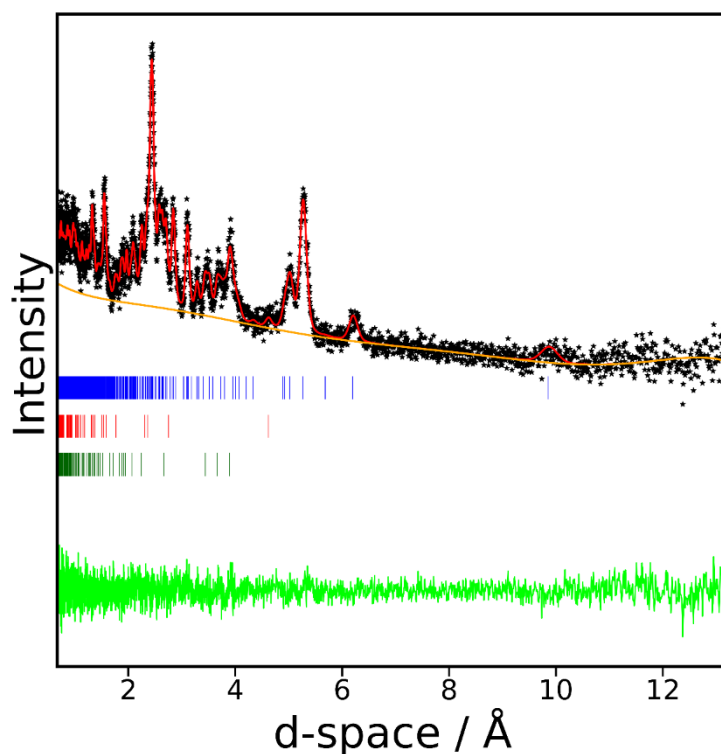
Figure S125: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 120 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.66 % and 4.11 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
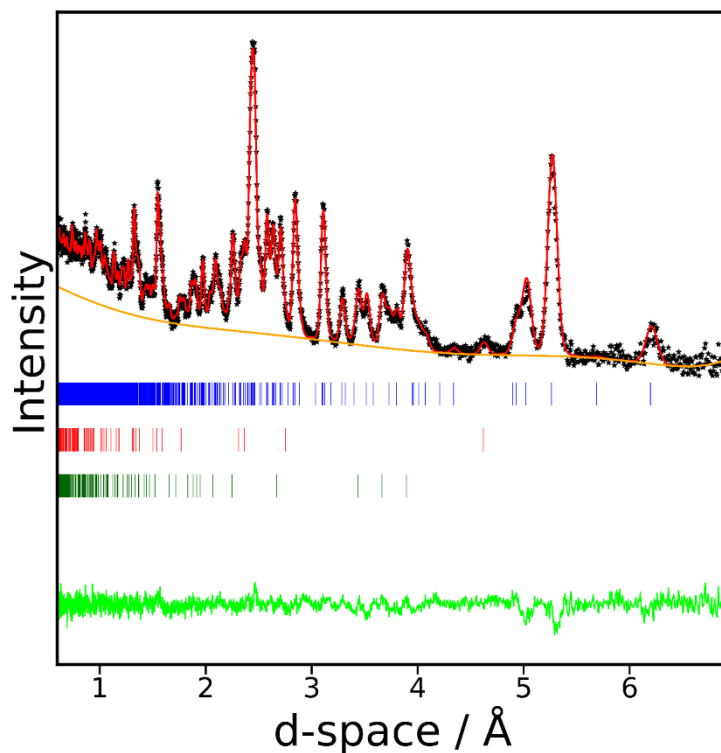
Figure S126: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 120 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.78 % and 2.90 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
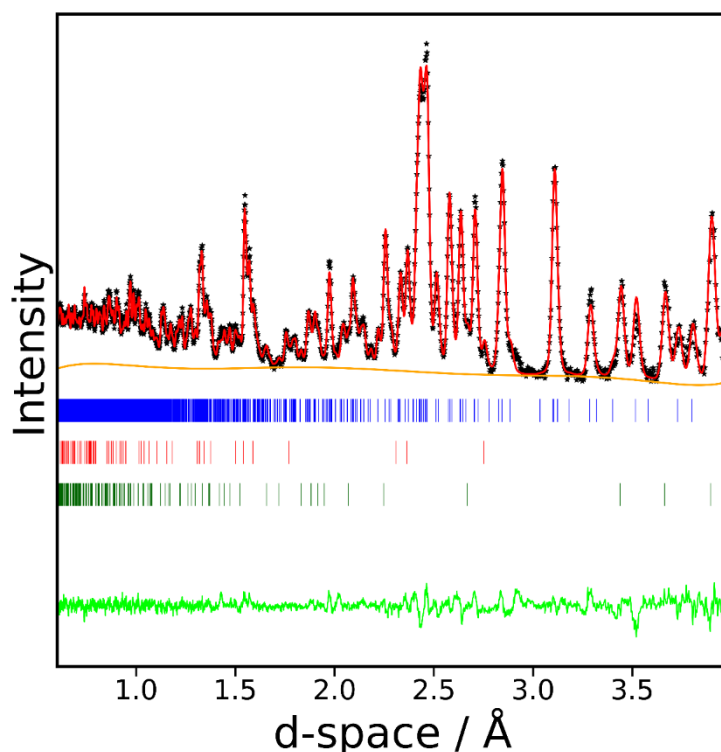
Figure S127: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 120 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.74 % and 2.81 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
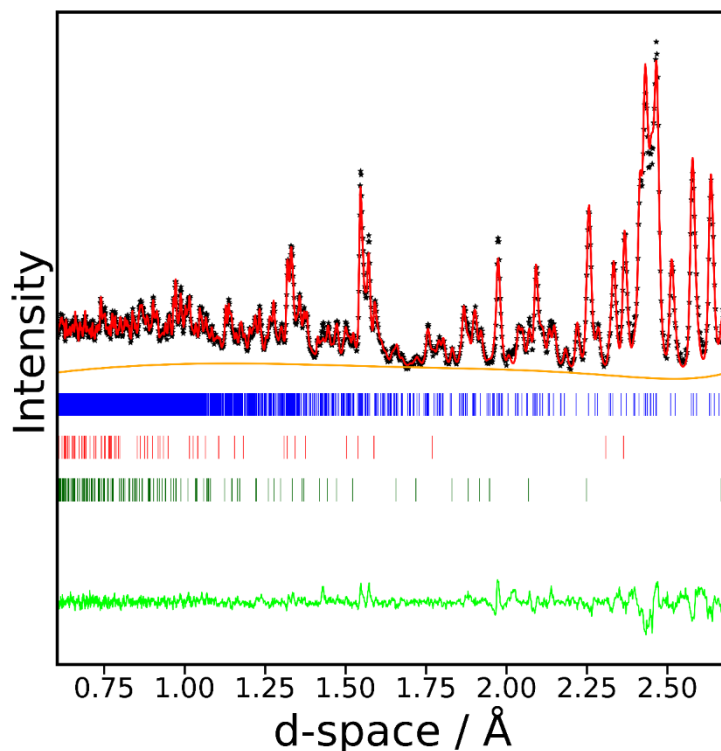
Figure S128: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 120 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.80 % and 2.94 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
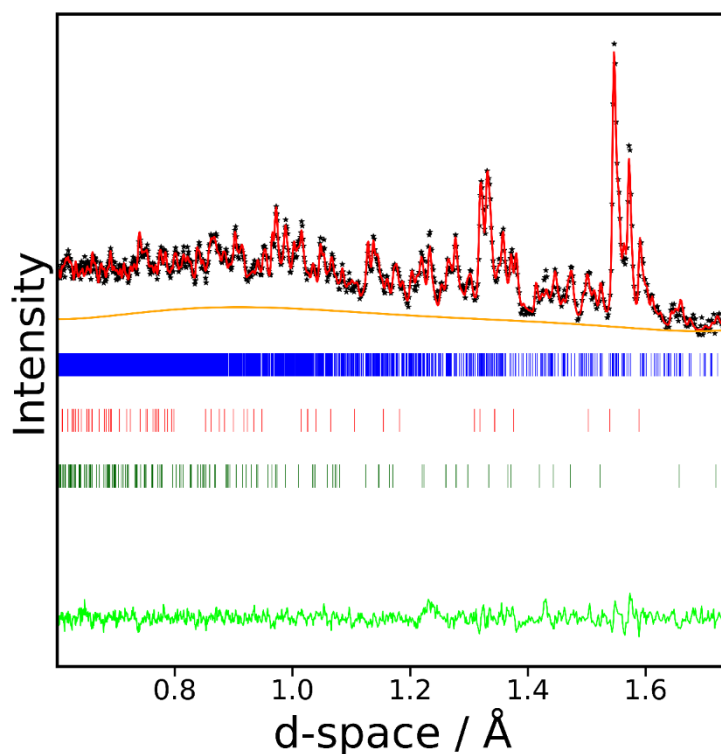
Figure S129: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 120 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.86 % and 2.20 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
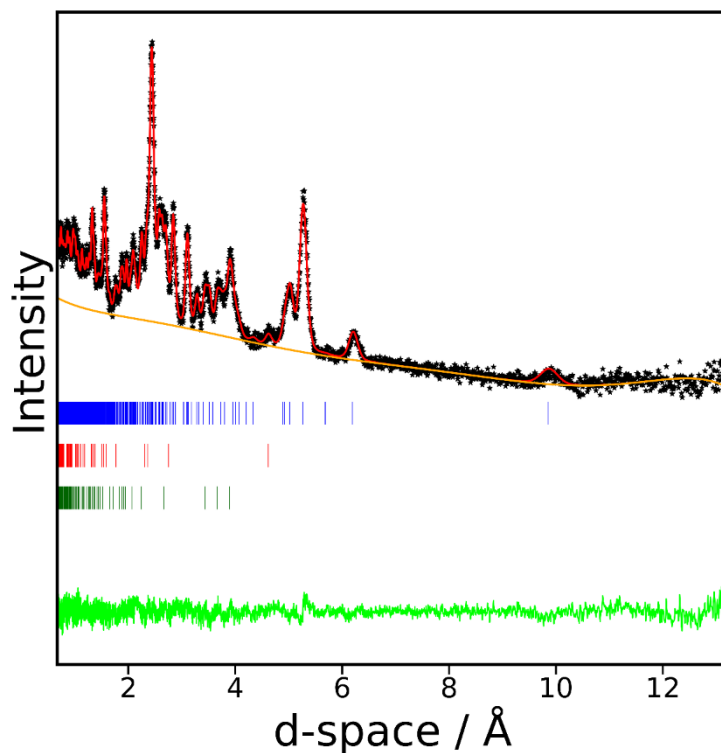
Figure S130: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 100 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.05 % and 2.30 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
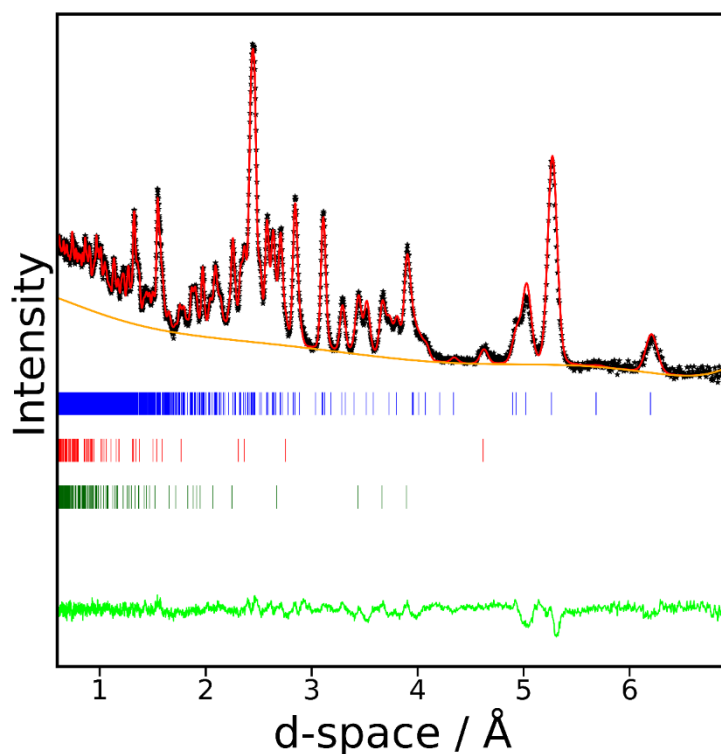
Figure S131: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 100 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.10 % and 2.20 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
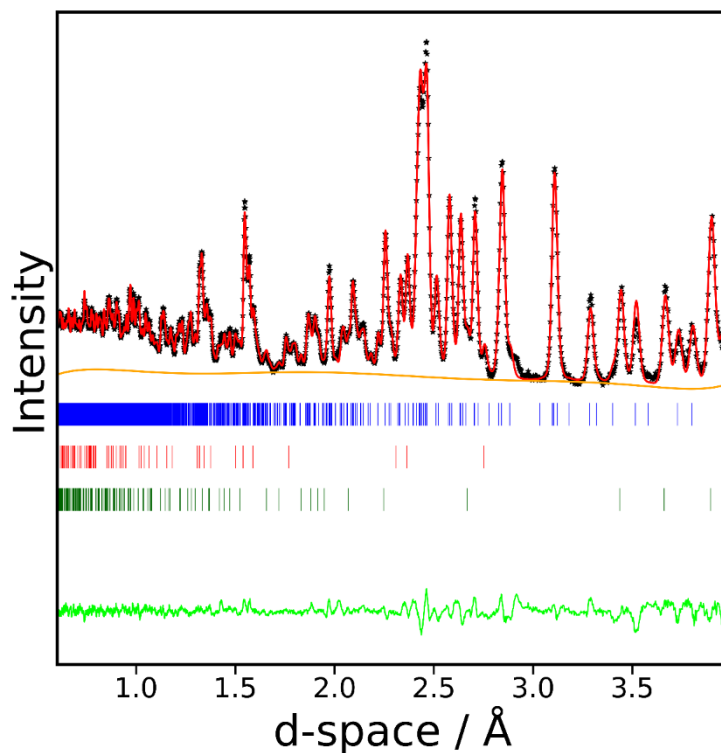
Figure S132: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 100 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.39 % and 2.44 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
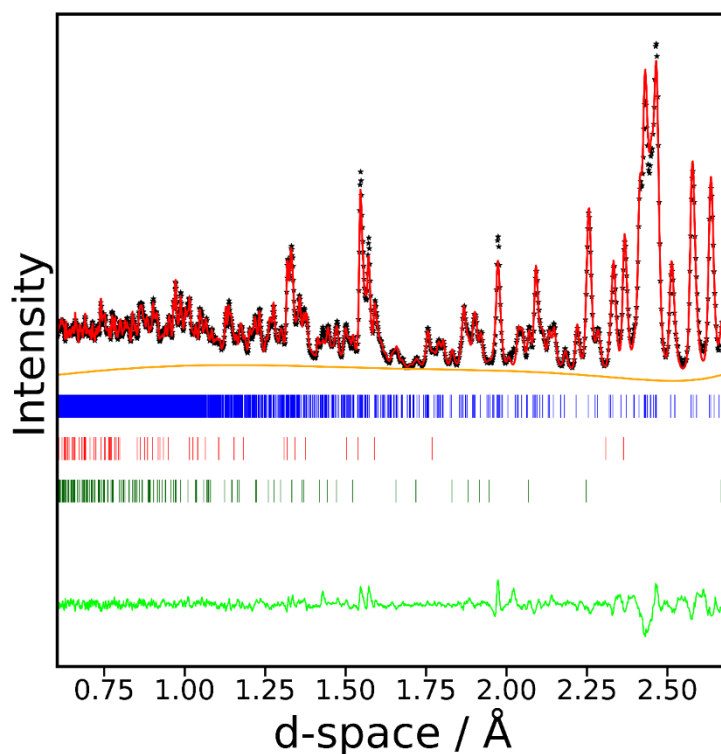
Figure S133: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 100 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.49 % and 2.63 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
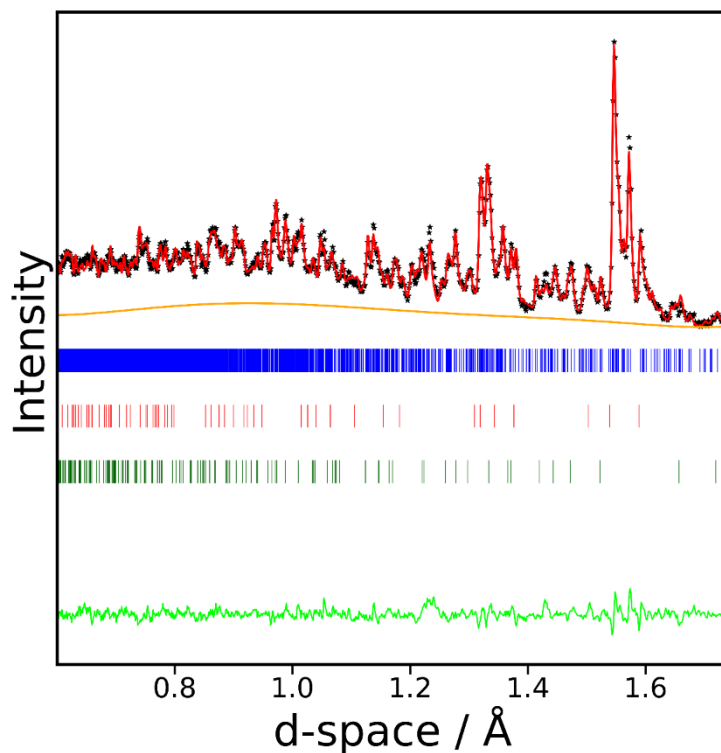
Figure S134: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 100 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.49 % and 1.82 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
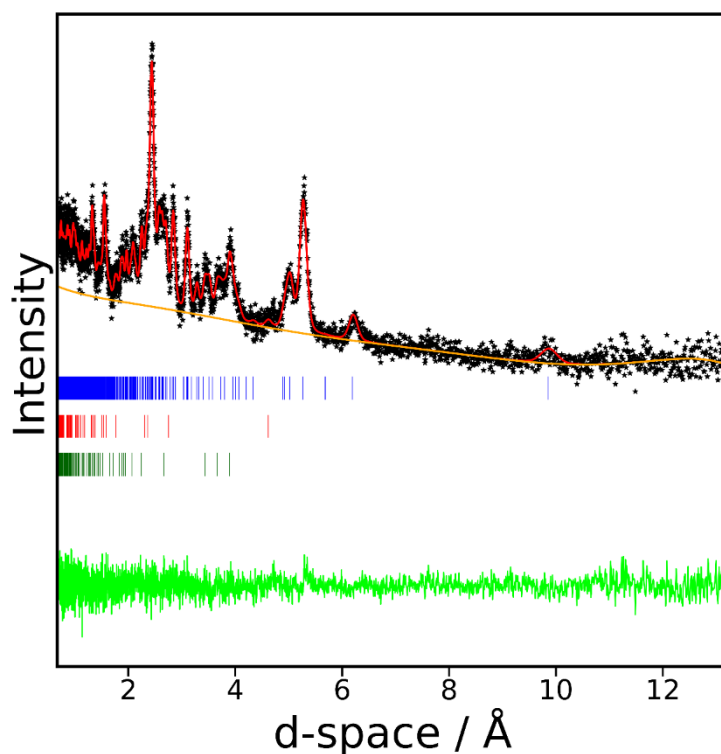
Figure S135: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 80 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.53 % and 4.04 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$ and D$_2$O phases, respectively.
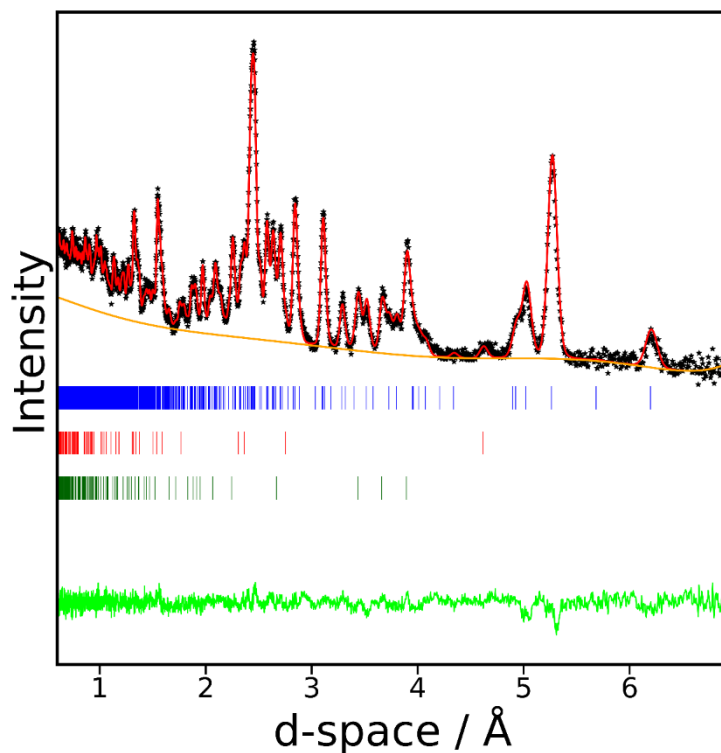
Figure S136: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 80 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.76 % and 2.87 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$ and D$_2$O phases, respectively.
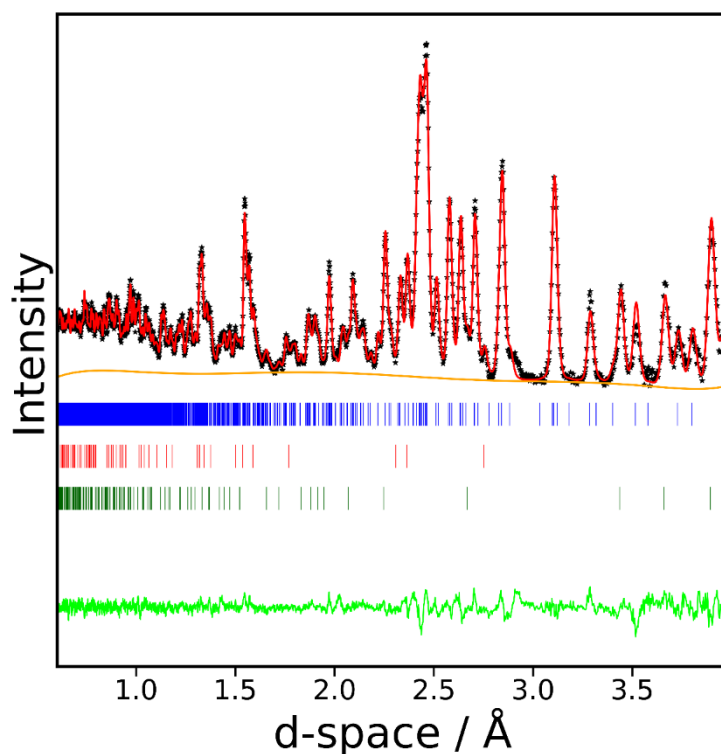
Figure S137: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 80 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.75 % and 2.84 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
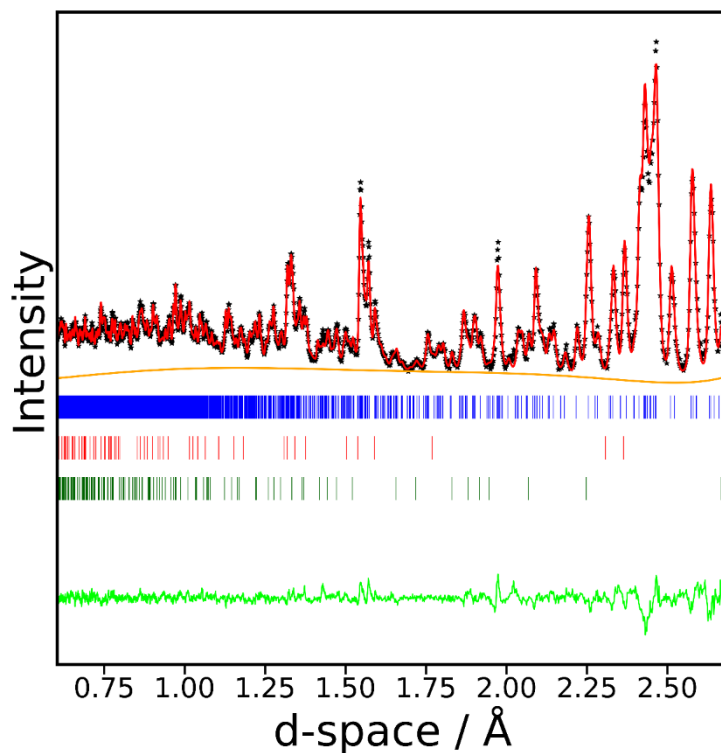
Figure S138: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 80 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.80 % and 2.96 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
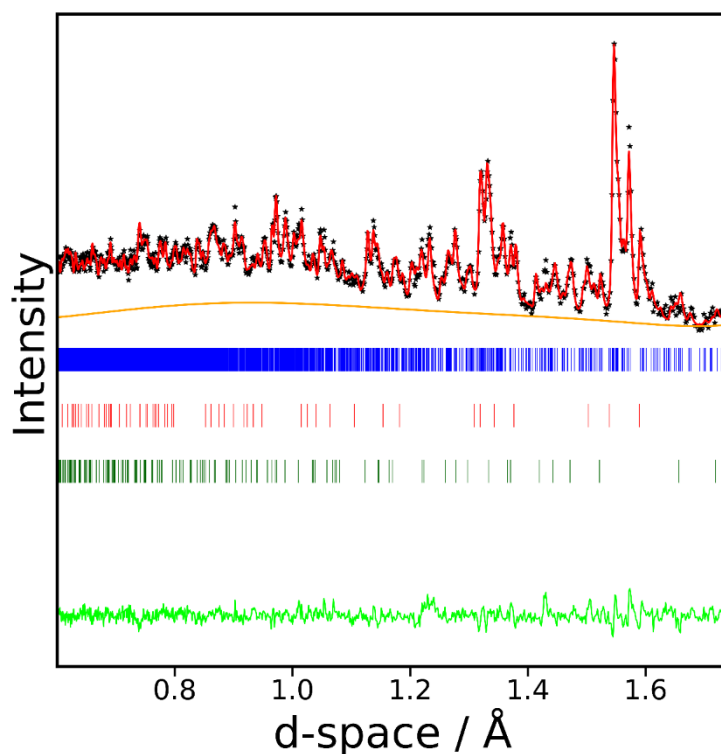
Figure S139: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 80 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.94 % and 2.27 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
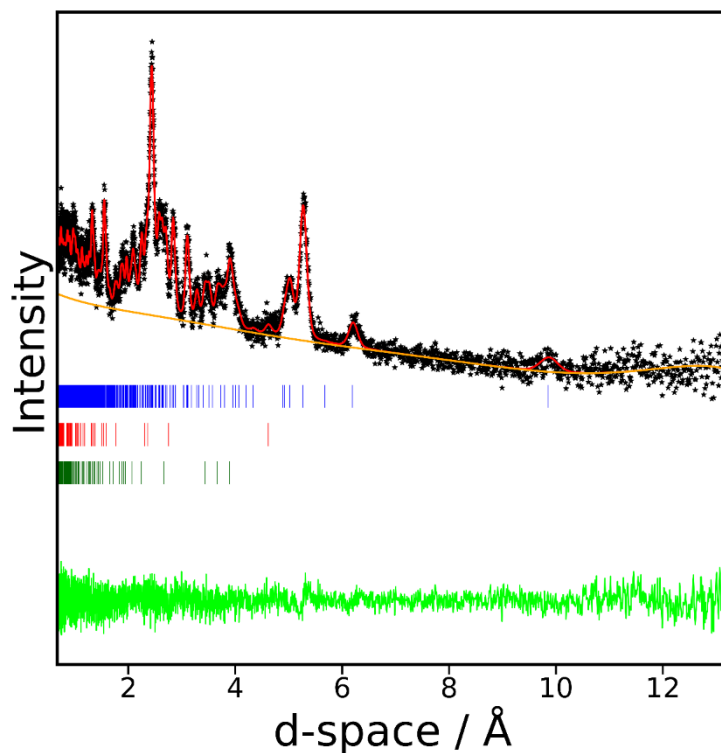
Figure S140: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 70 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.81 % and 4.09 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
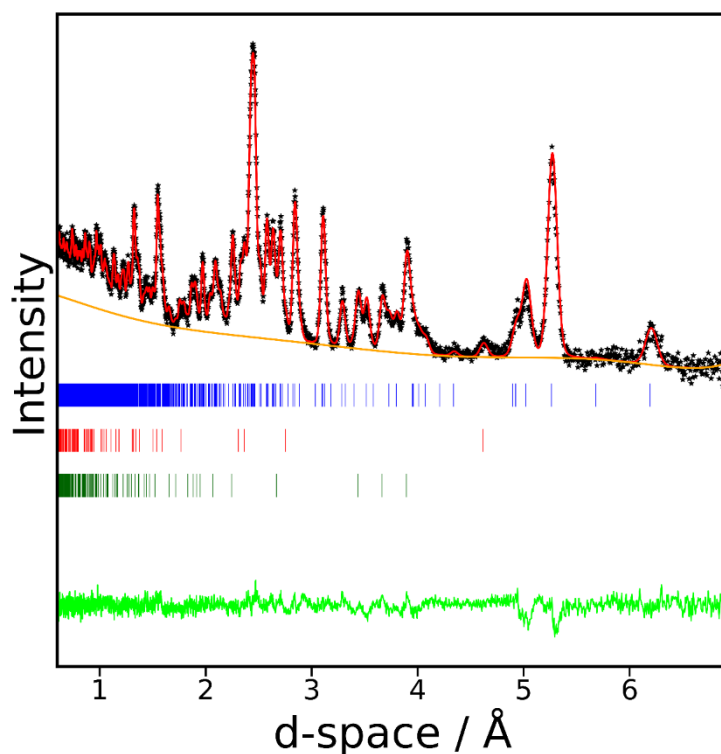
Figure S141: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 70 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.81 % and 2.93 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
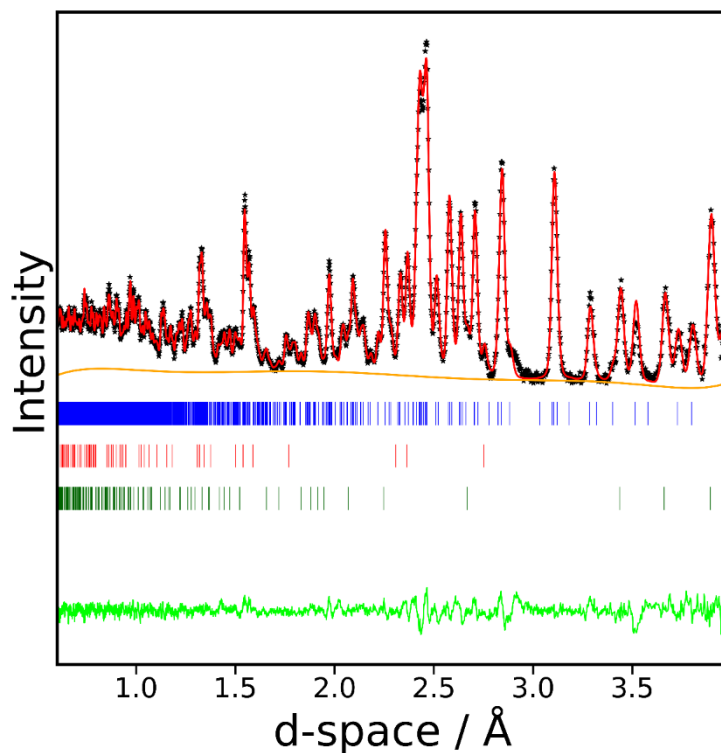
Figure S142: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 70 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.81 % and 2.92 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
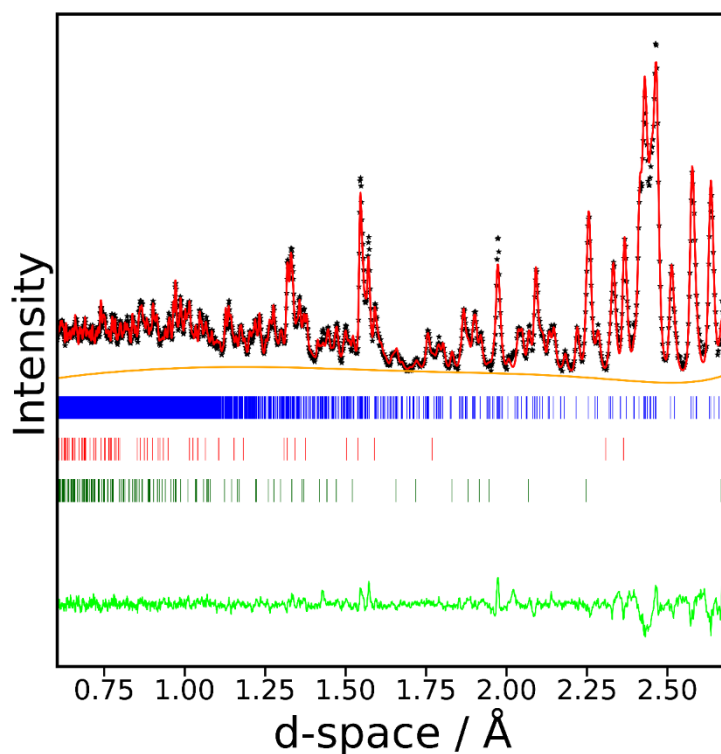
Figure S143: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 70 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.91 % and 3.08 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
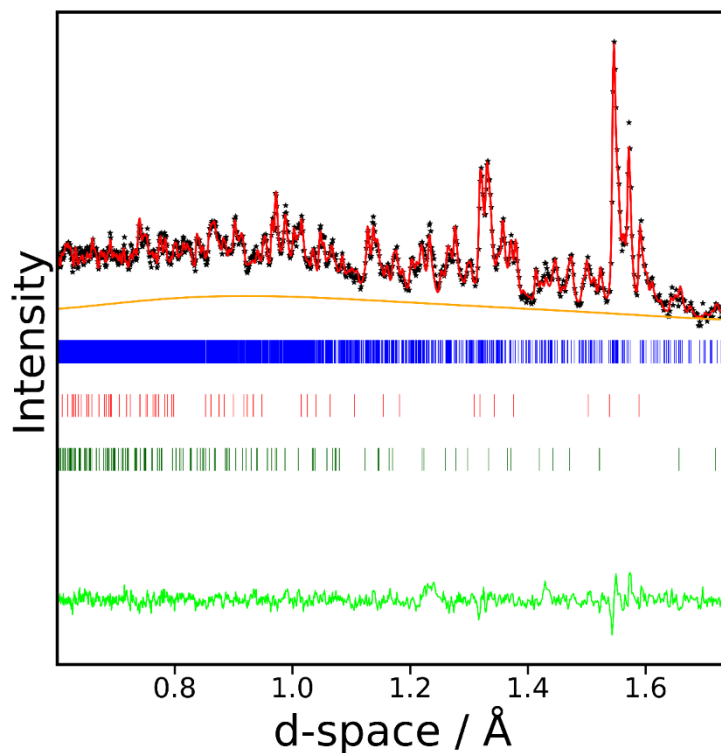

Figure S144: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 70 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.93 % and 2.29 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
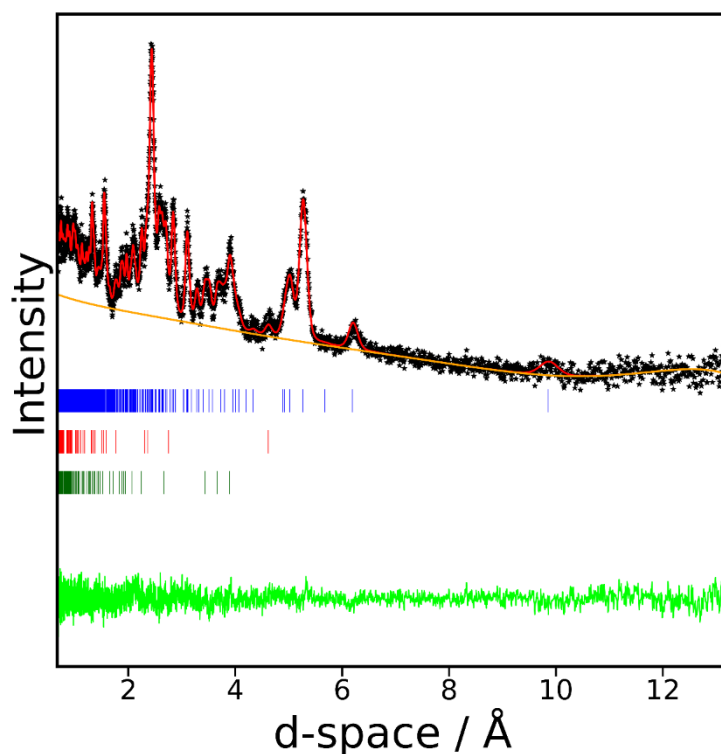
Figure S145: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 66 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.62 % and 3.01 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
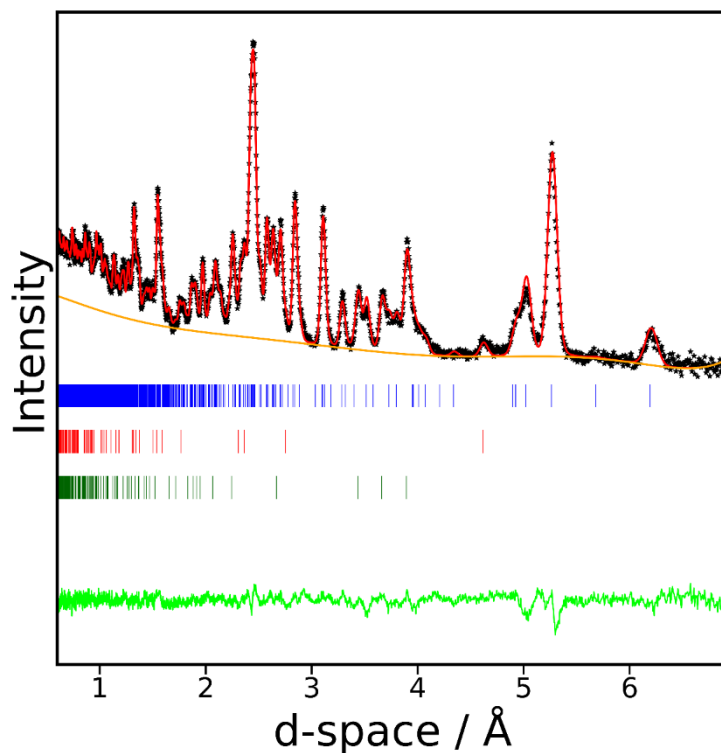

Figure S146: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 66 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.37 % and 2.48 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
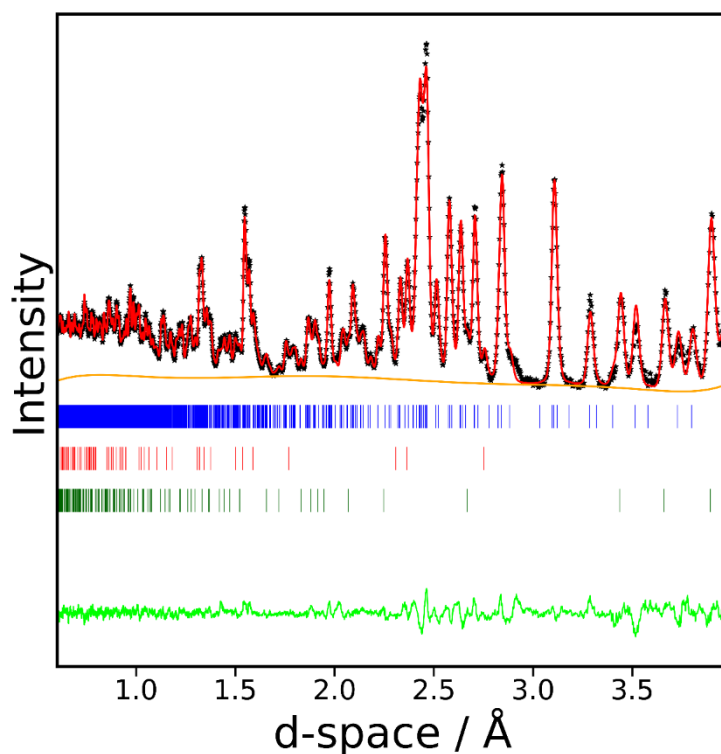
Figure S147: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 66 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 2.53 % and 2.61 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$ and D$_2$O phases, respectively.
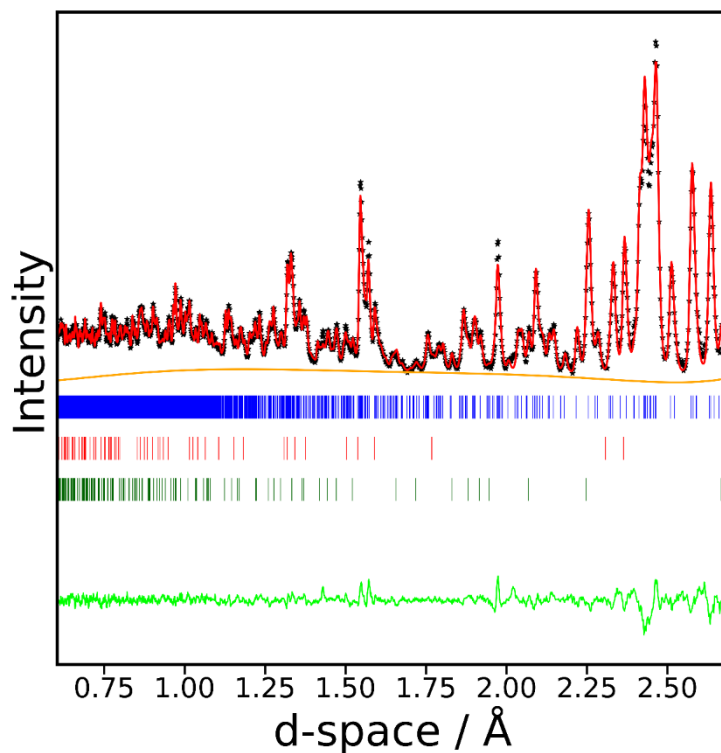
Figure S148: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 66 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 2.59 % and 2.76 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$ and D$_2$O phases, respectively.
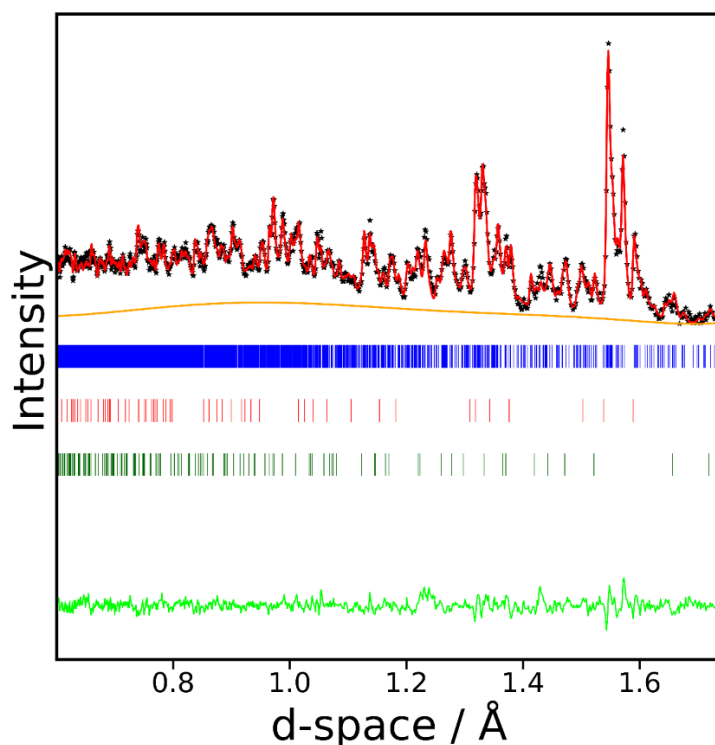
Figure S149: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 66 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.68 % and 2.01 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$ and D$_2$O phases, respectively.
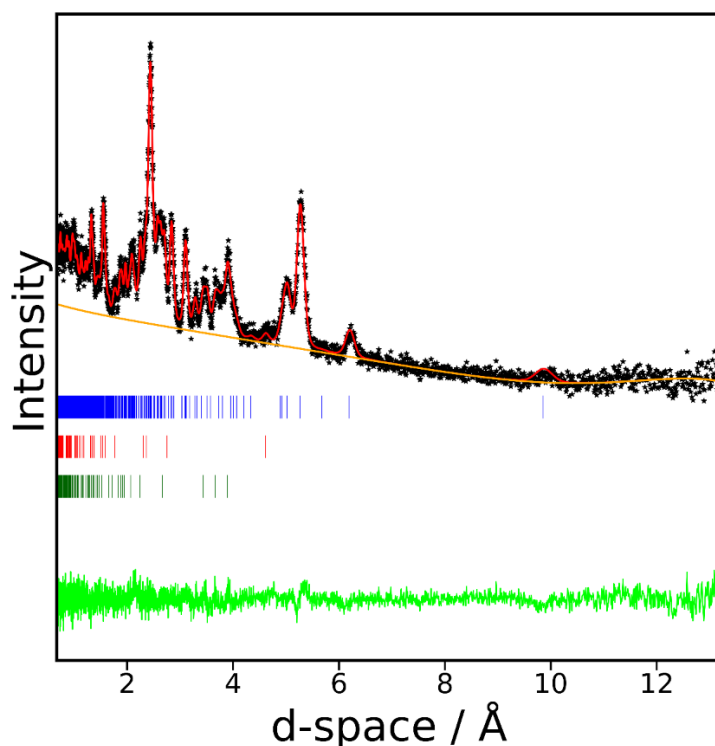
Figure S150: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 60 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.69 % and 3.00 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$ and D$_2$O phases, respectively.
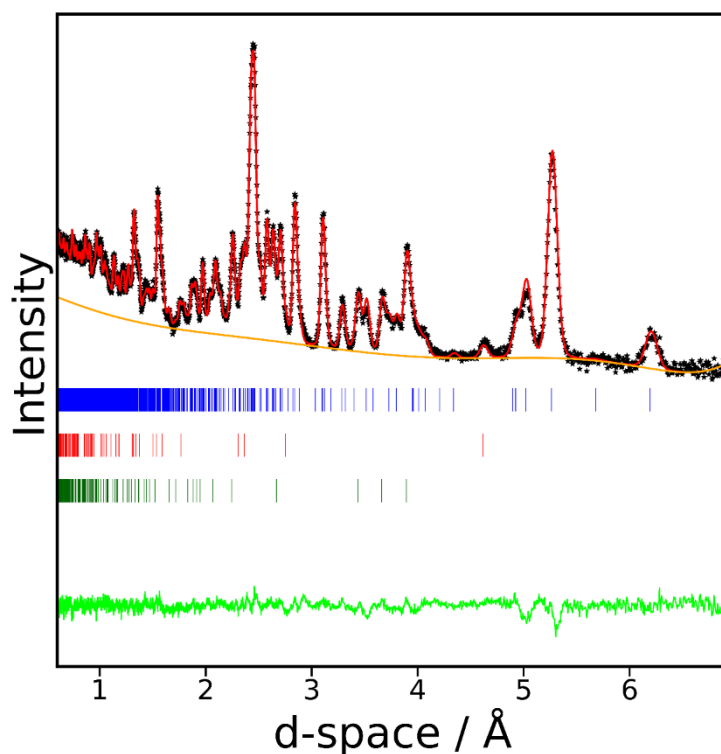
Figure S151: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 60 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.26 % and 2.38 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$ and D$_2$O phases, respectively.
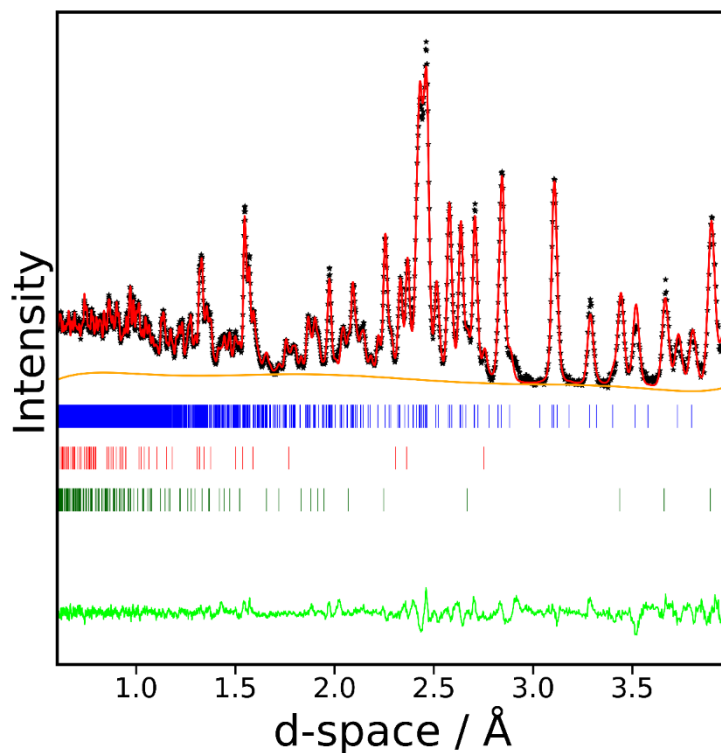
Figure S152: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 60 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.47 % and 2.58 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$ and D$_2$O phases, respectively.
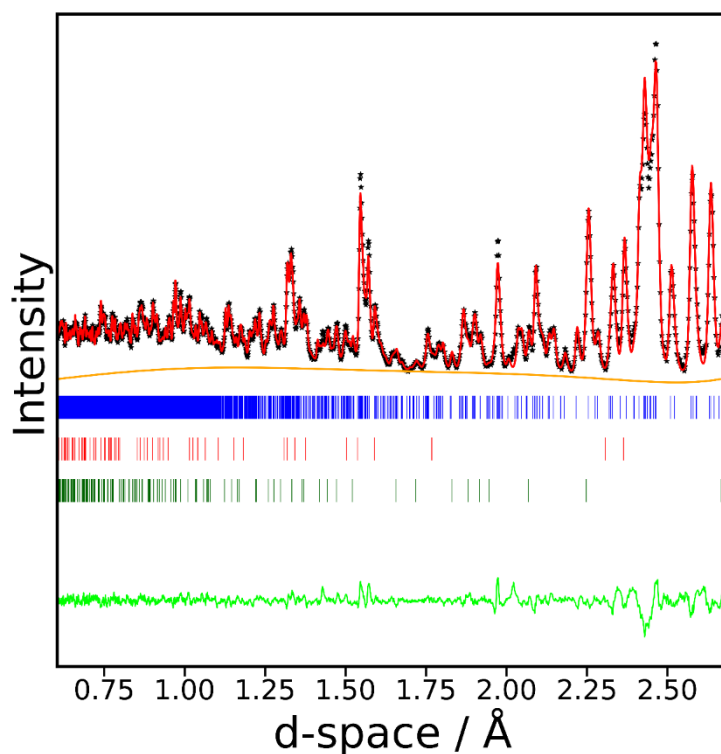
Figure S153: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 60 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.66 % and 2.84 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
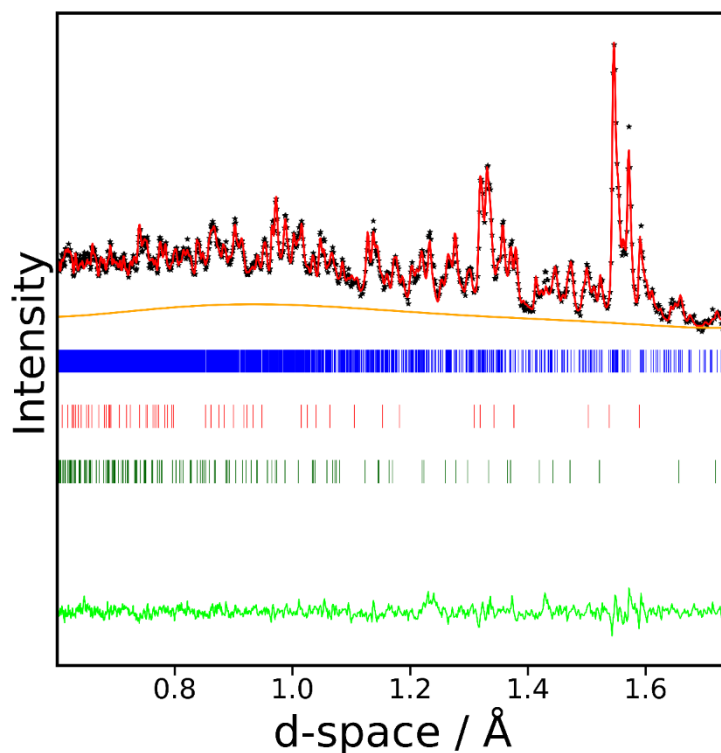

Figure S144: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 60 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.67 % and 1.99 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red and green markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$ and D_2O phases, respectively.
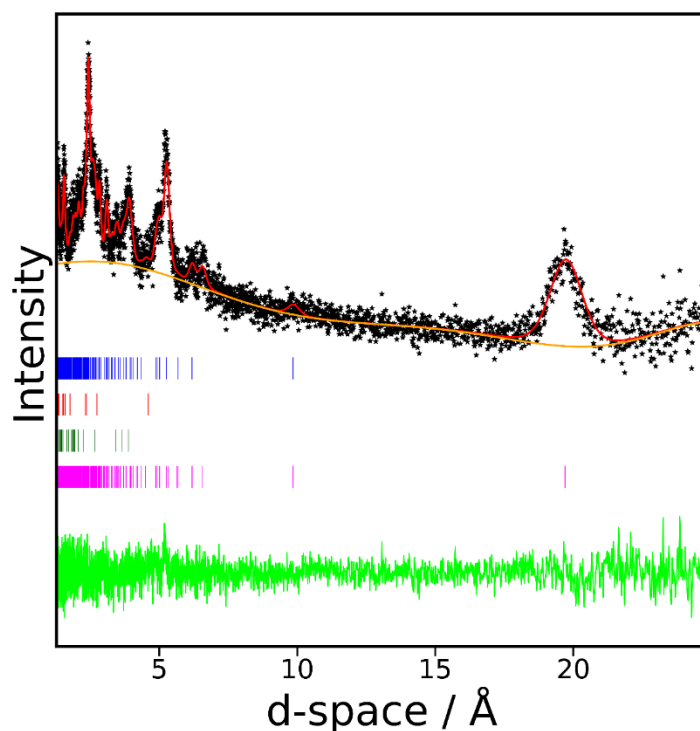
Figure S155: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 55.6 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.98 % and 4.50 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

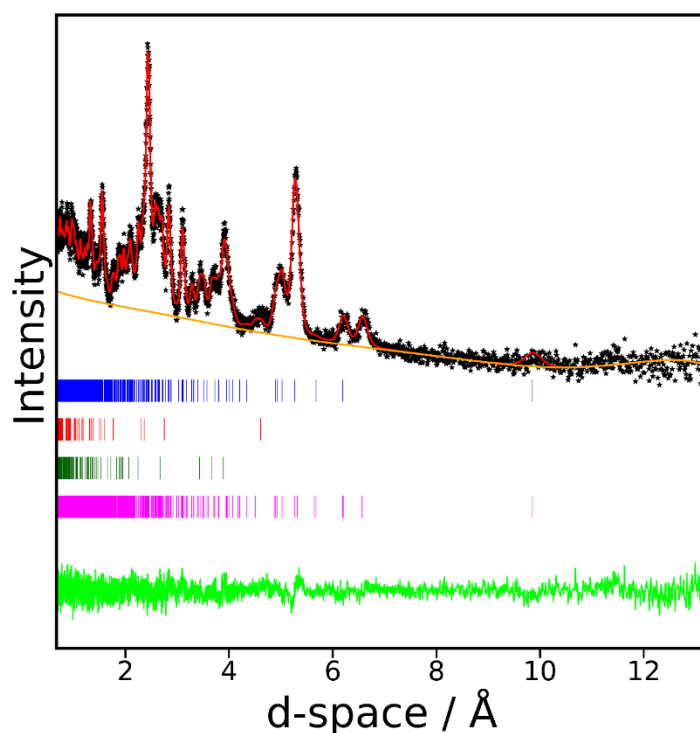**Figure S156:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 55.6 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.81 % and 3.09 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
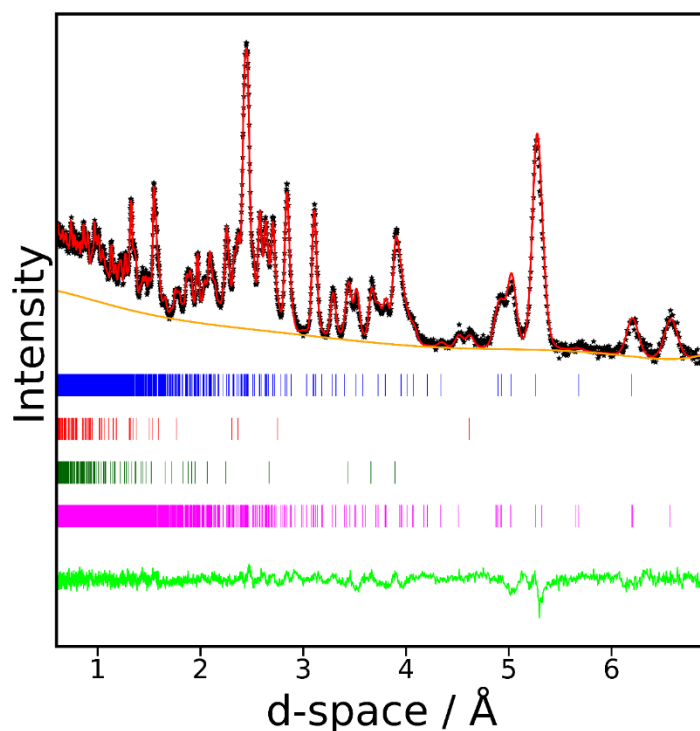
Figure S157: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 55.6 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.26 % and 2.34 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

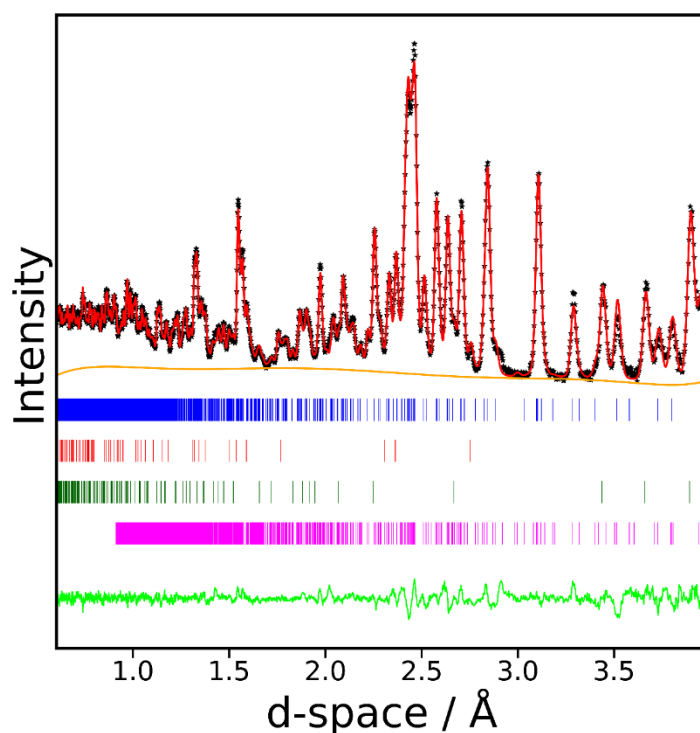**Figure S158:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 55.6 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.43 % and 2.53 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
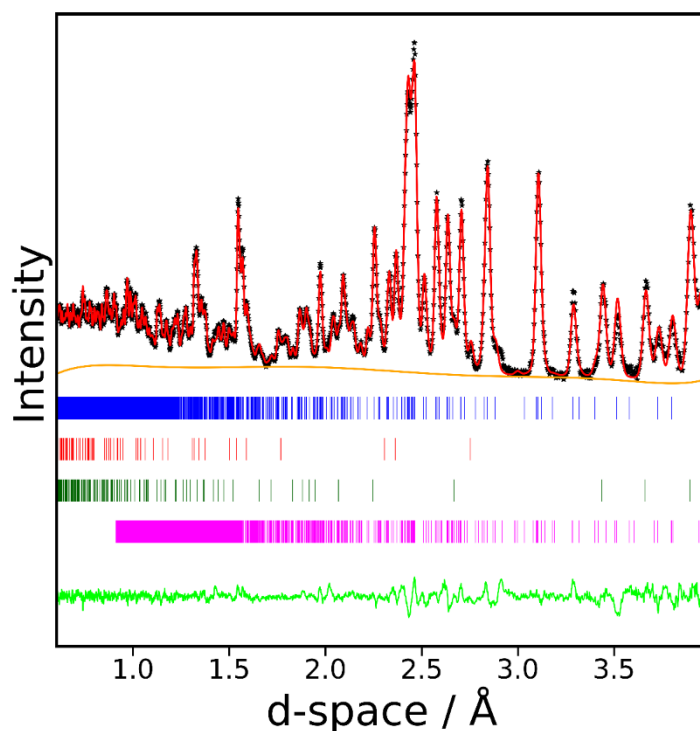
Figure S159: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 55.6 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.61 % and 2.76 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

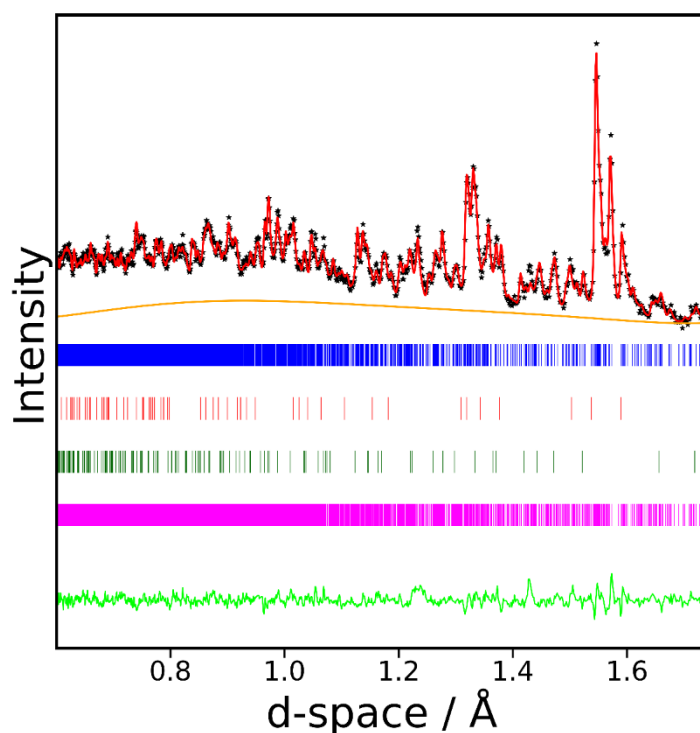**Figure S160:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 55.6 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.63 % and 1.99 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
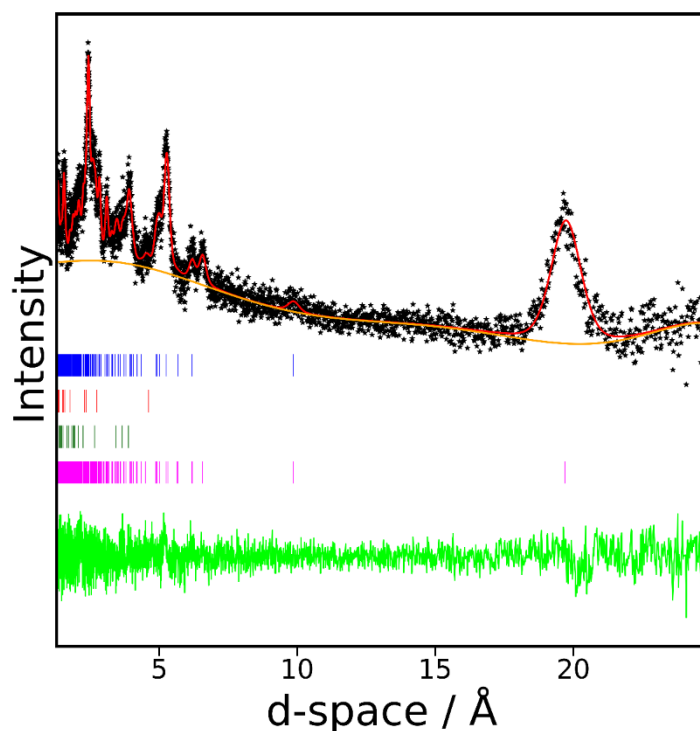
Figure S161: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 50 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 4.12 % and 4.57 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
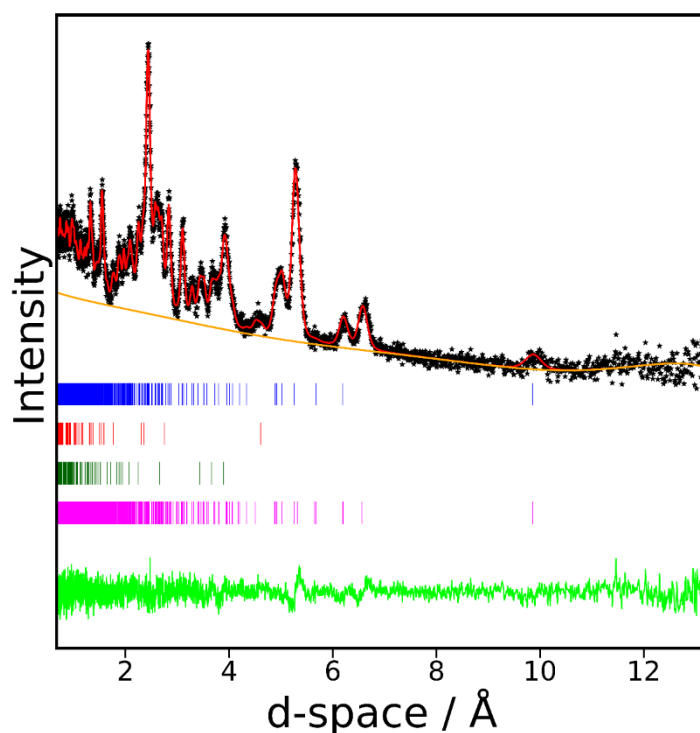
Figure S162: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 50 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.87 % and 3.14 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
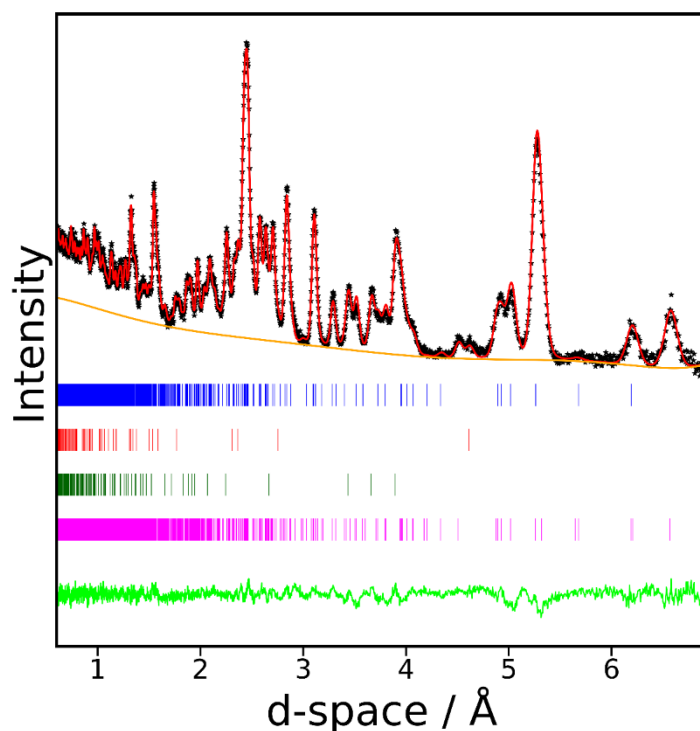
Figure S163: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 50 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.32 % and 2.40 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
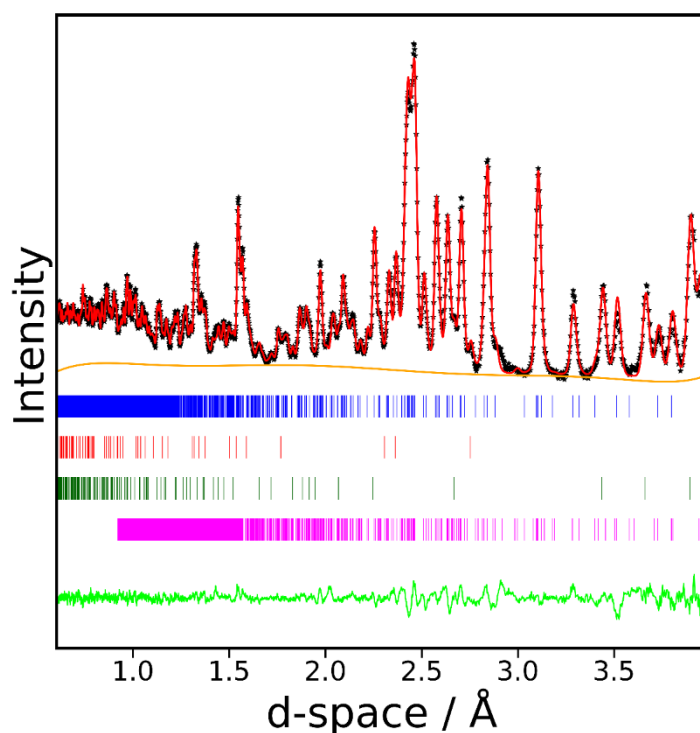
Figure S164: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 50 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.47 % and 2.53 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
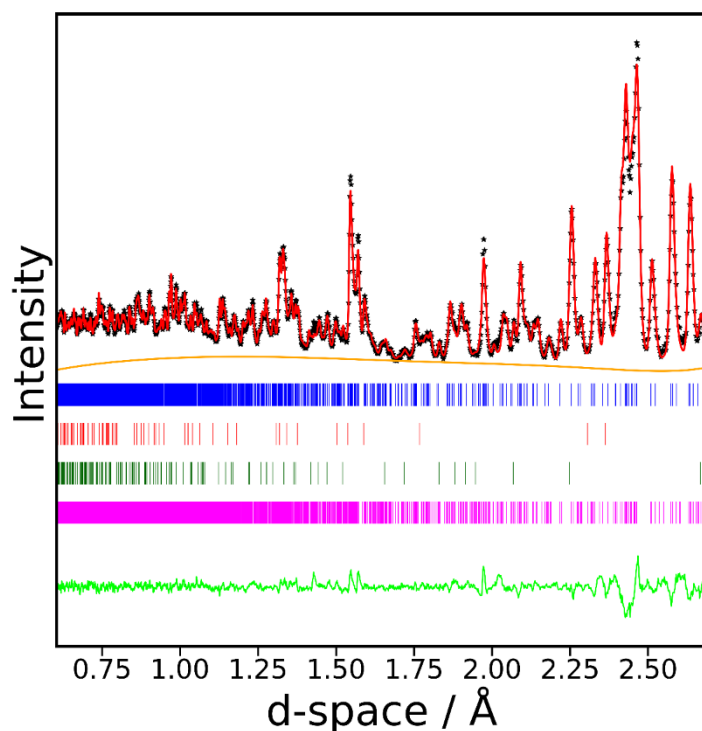
Figure S165: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 50 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.69 % and 2.80 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
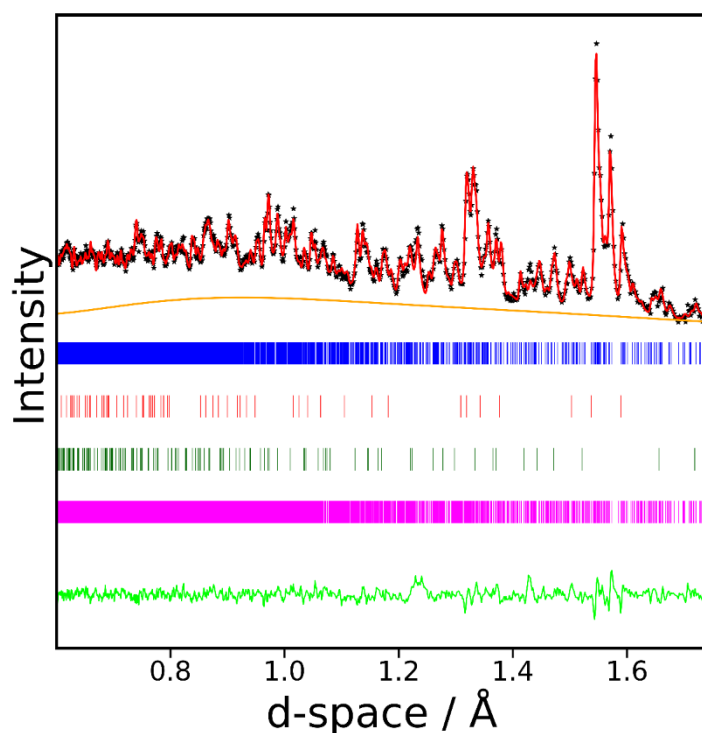
Figure S166: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 50 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.70 % and 2.02 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.

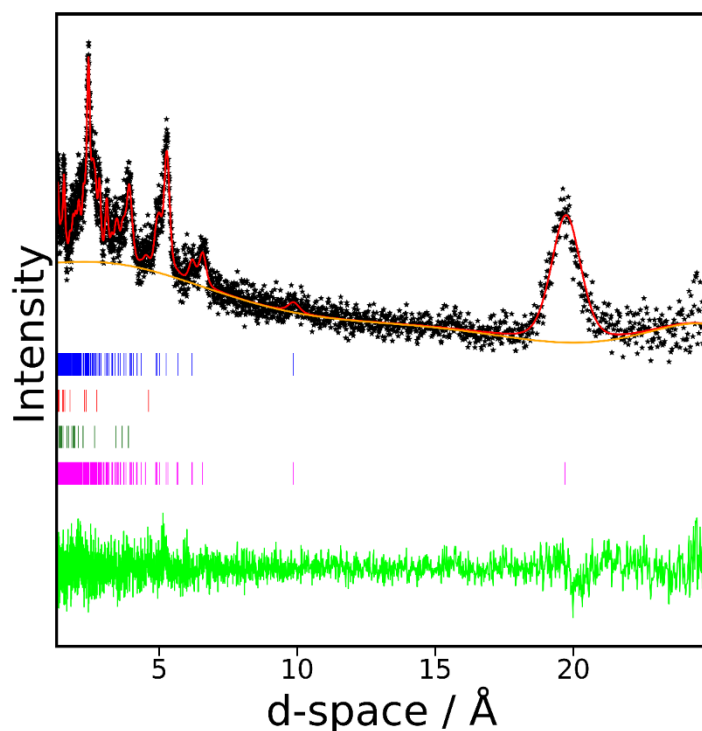**Figure S167:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 45.7 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 4.02 % and 4.55 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

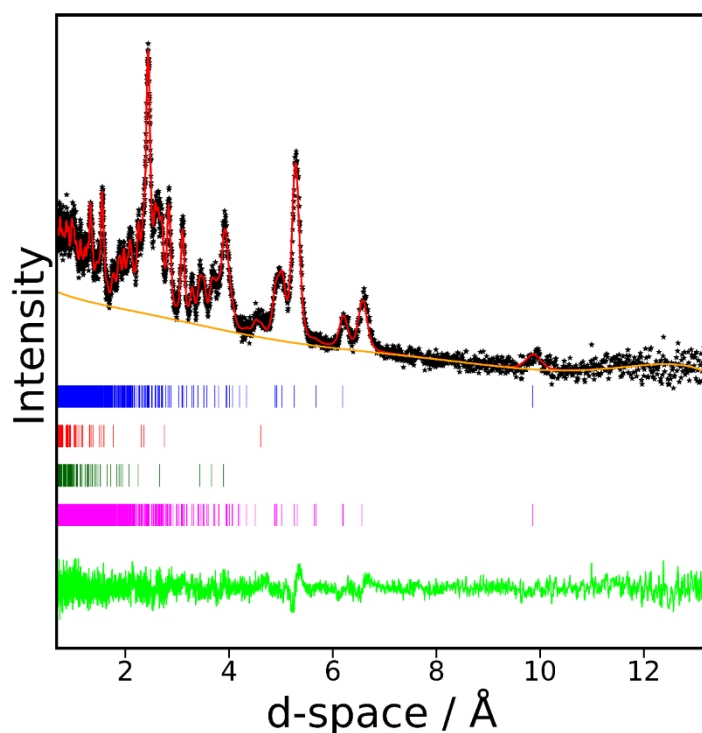**Figure S168:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 45.7 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.85 % and 3.21 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
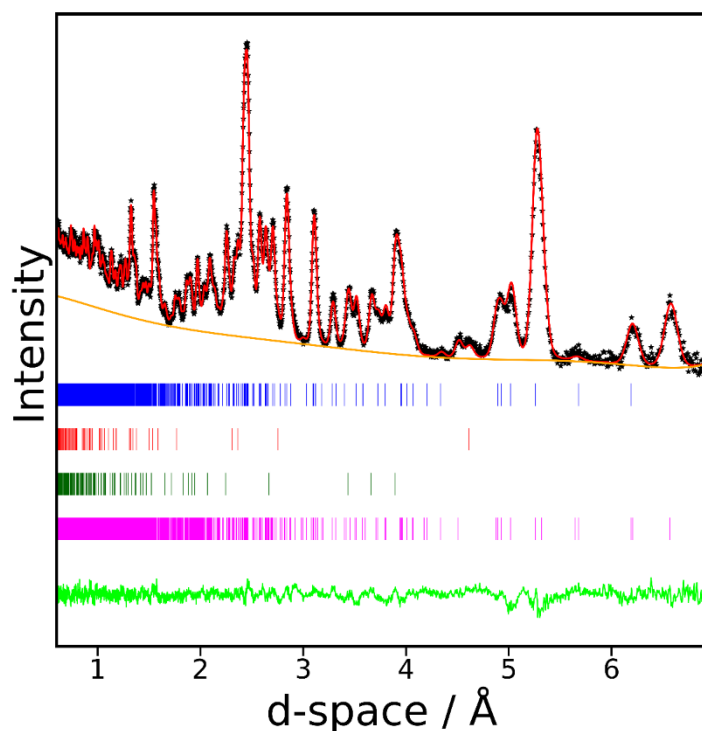
Figure S169: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 45.7 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.29 % and 2.38 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
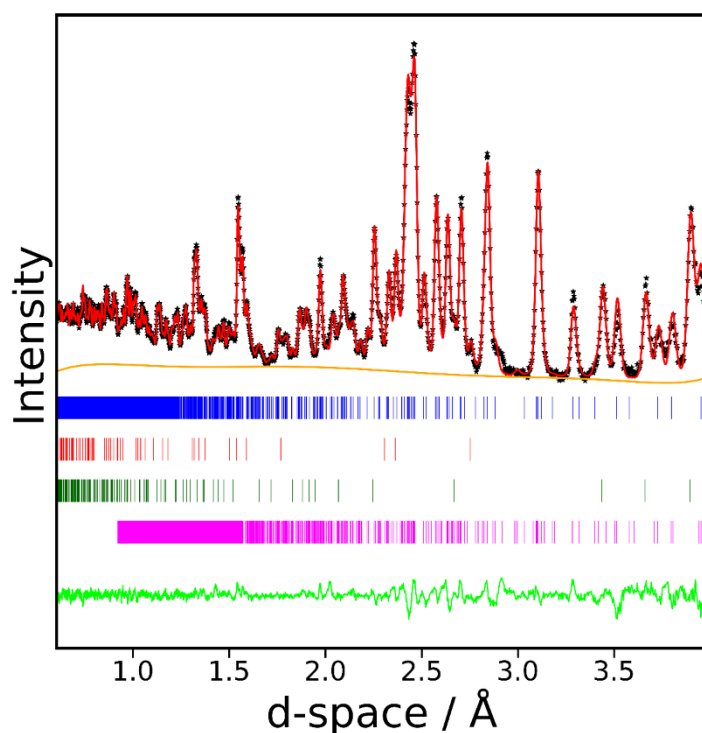
Figure S170: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 45.7 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.49 % and 2.58 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
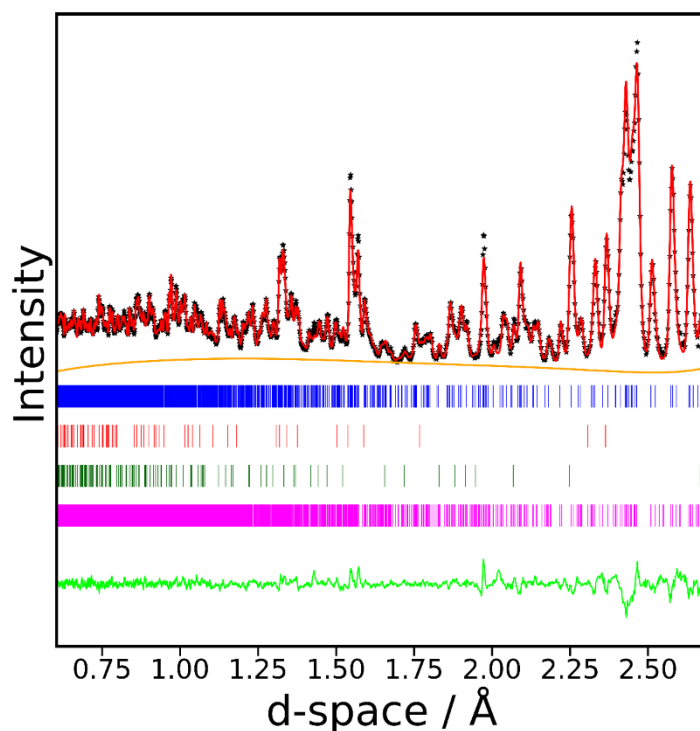
Figure S171: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 45.7 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 2.55 % and 2.73 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
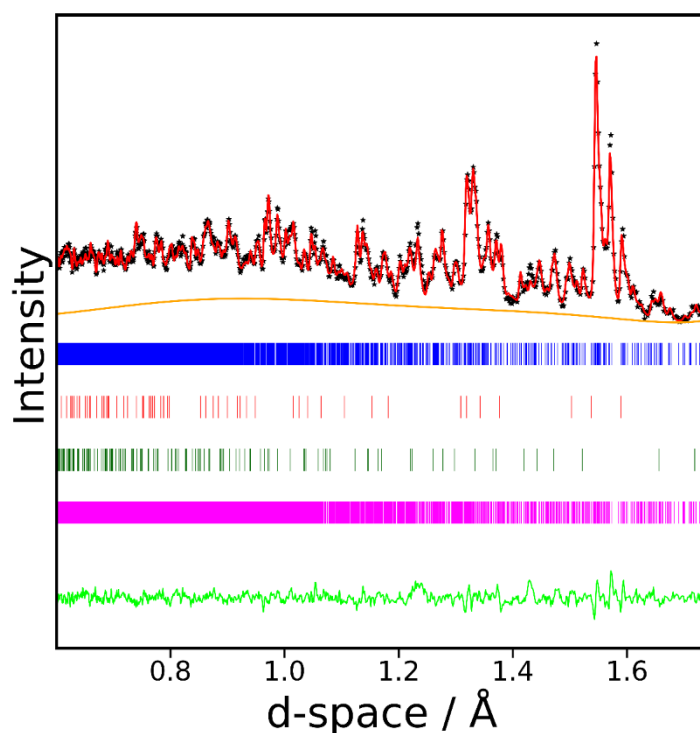
Figure S172: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 45.7 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 1.70 % and 2.02 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.

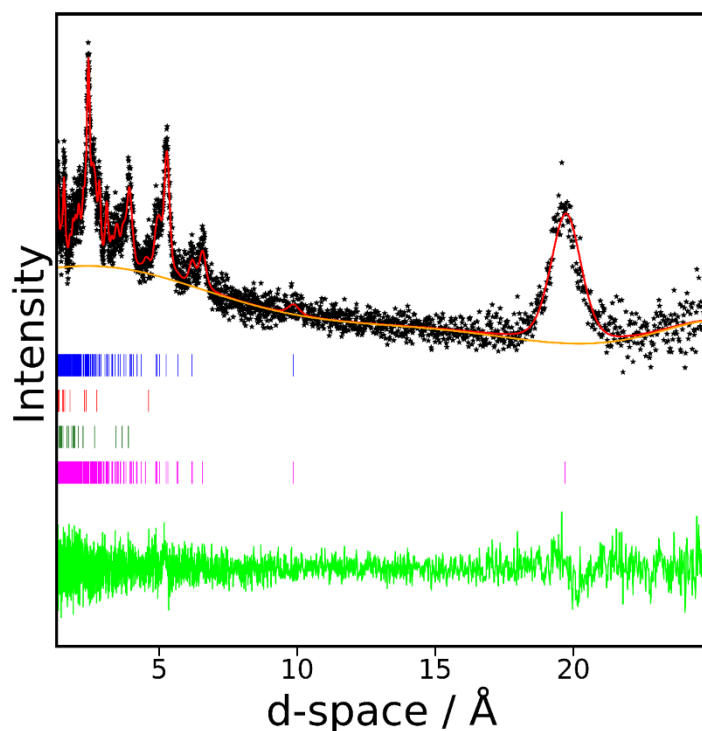**Figure S173:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 40 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 4.20 % and 4.64 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
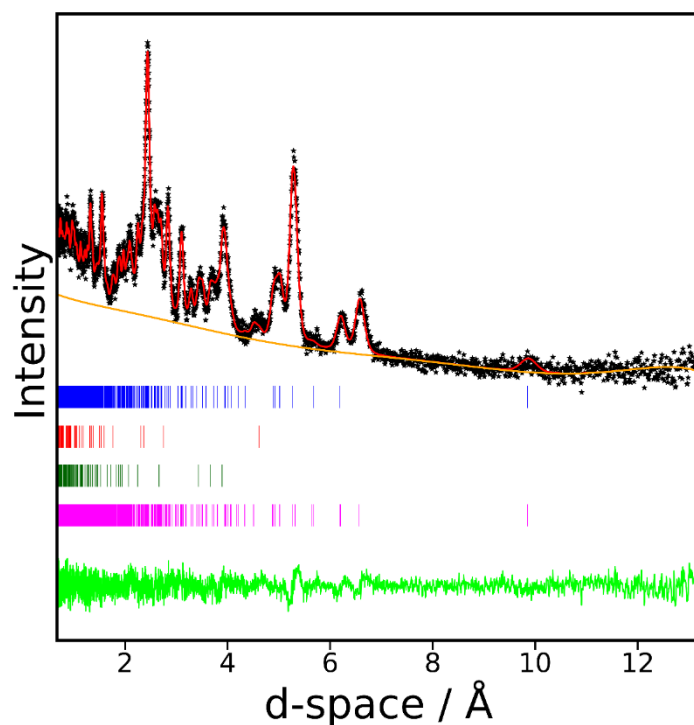
Figure S174: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 40 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.85 % and 3.19 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
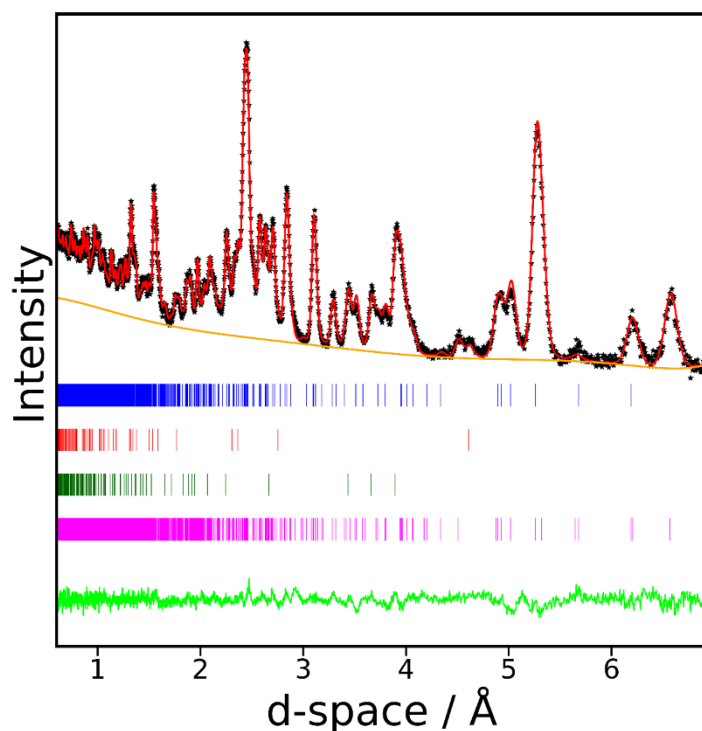
Figure S175: Neutron diffraction pattern collected from [Li(C_2O_4)]$_2$[Co$_5$(OD)$_8$] at 40 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.24 % and 2.36 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C_2O_4)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
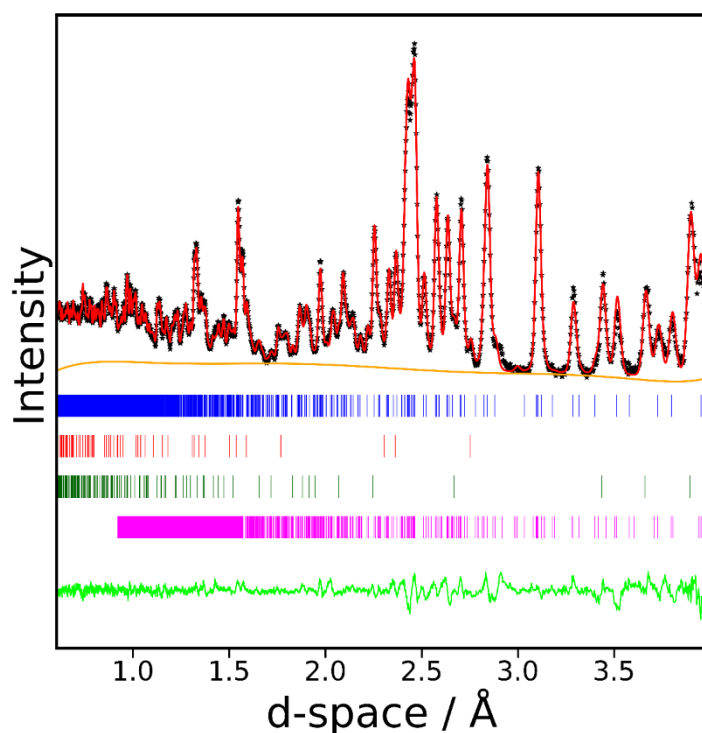
Figure S176: Neutron diffraction pattern collected from [Li(C_2O_4)]$_2$[Co$_5$(OD)$_8$] at 40 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.55 % and 2.59 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C_2O_4)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
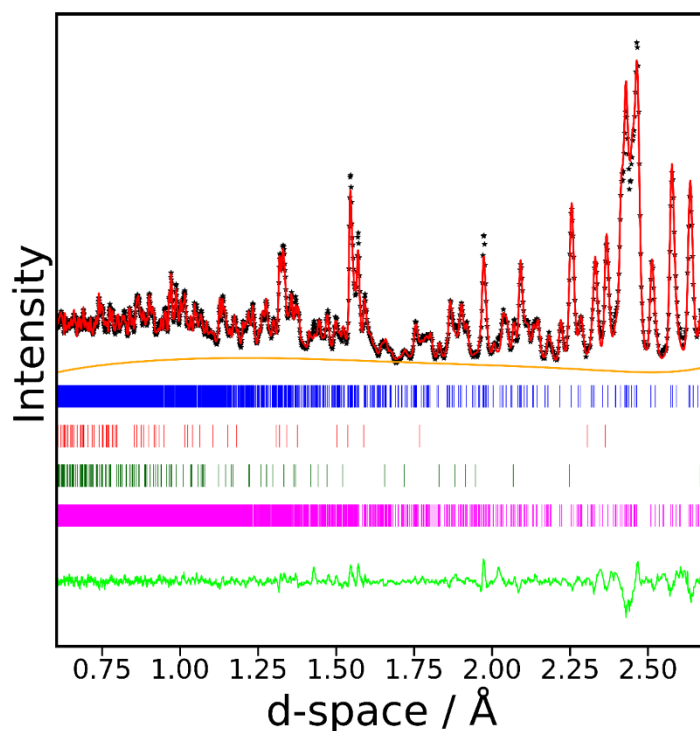
Figure S177: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 40 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.59 % and 2.79 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
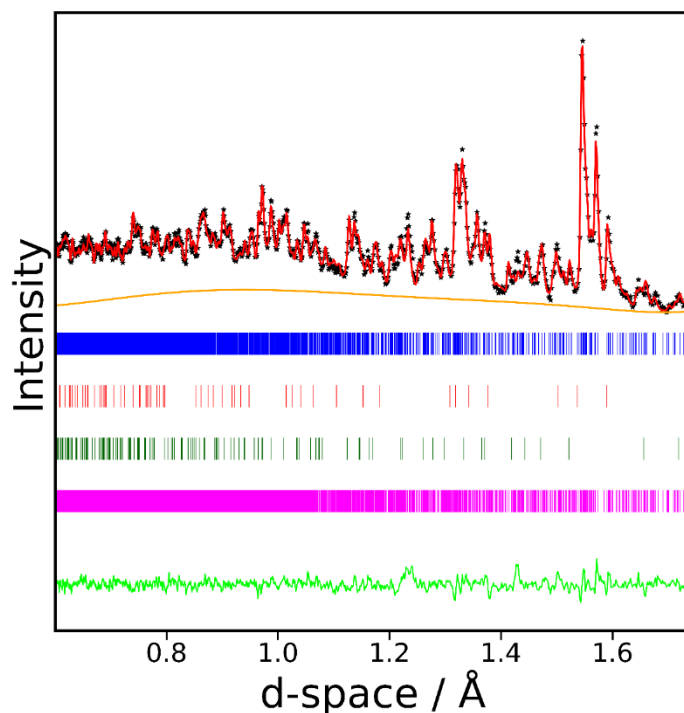
Figure S178: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 40 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.67 % and 2.00 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
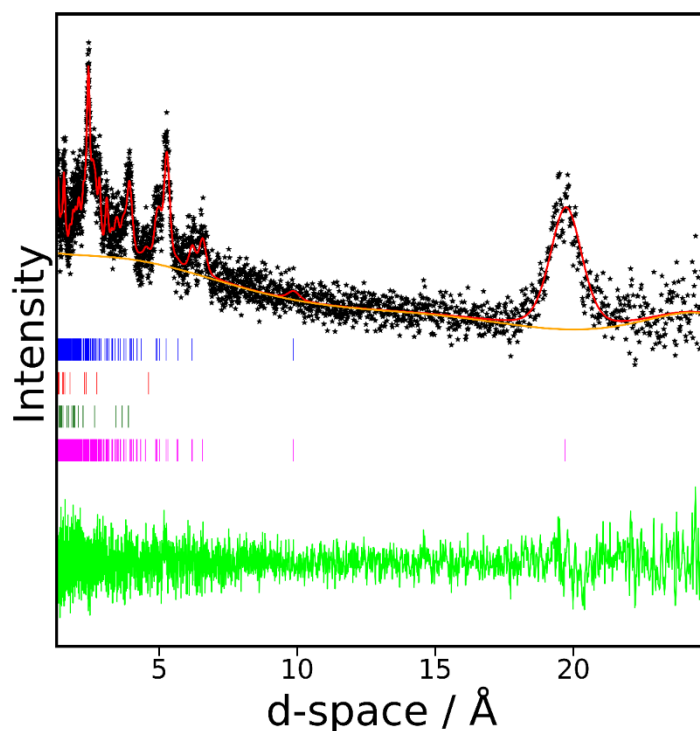
Figure S179: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 36 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 5.68 % and 6.24 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

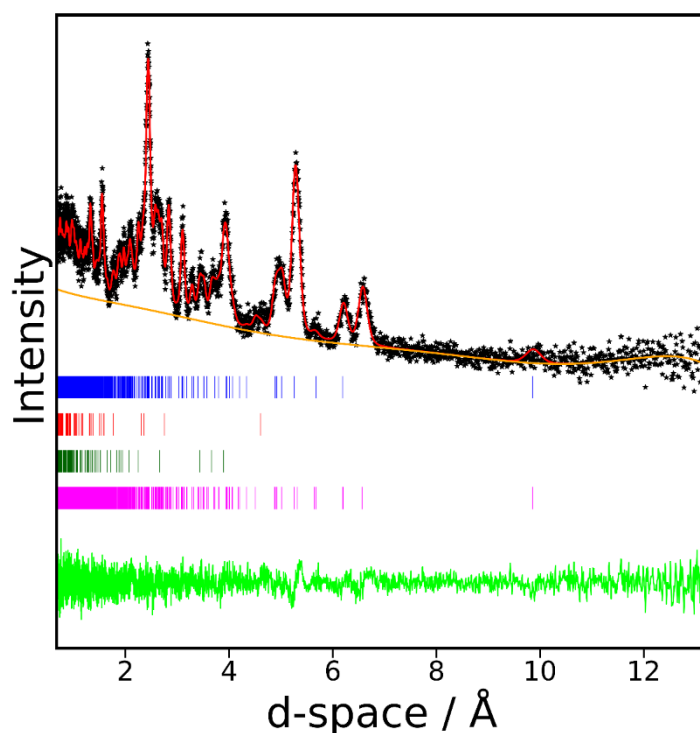**Figure S180:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 36 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.68 % and 4.17 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
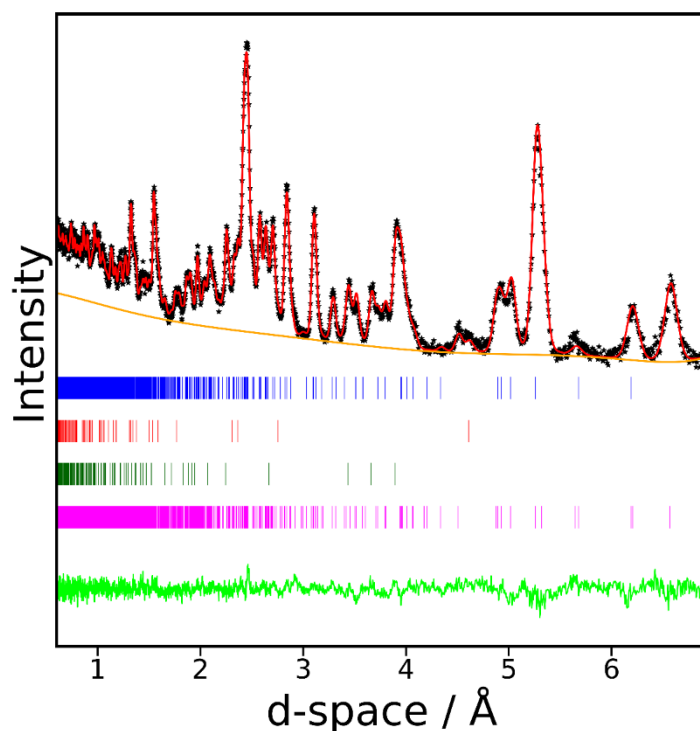
Figure S181: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 36 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.77 % and 2.91 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
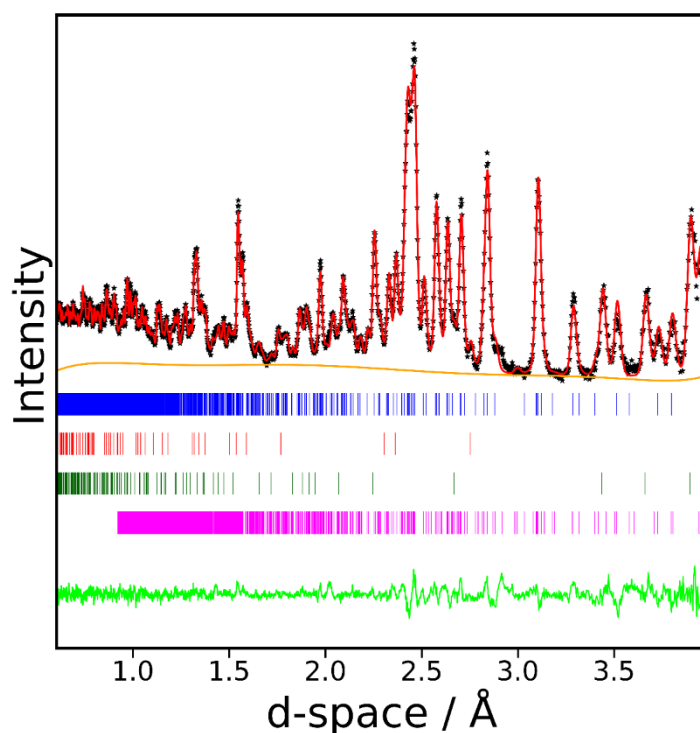
Figure S182: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 36 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.93 % and 2.90 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
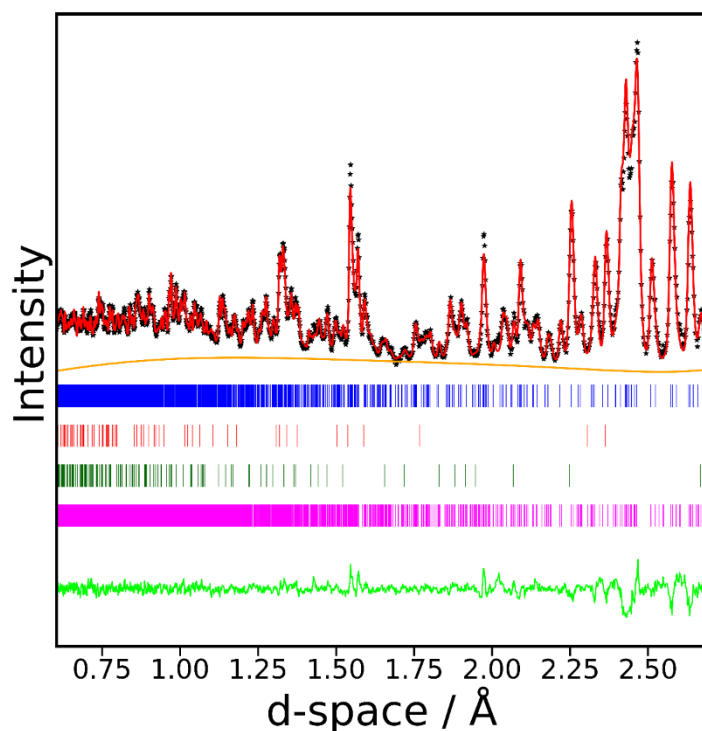
Figure S183: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 36 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 2.88 % and 3.02 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
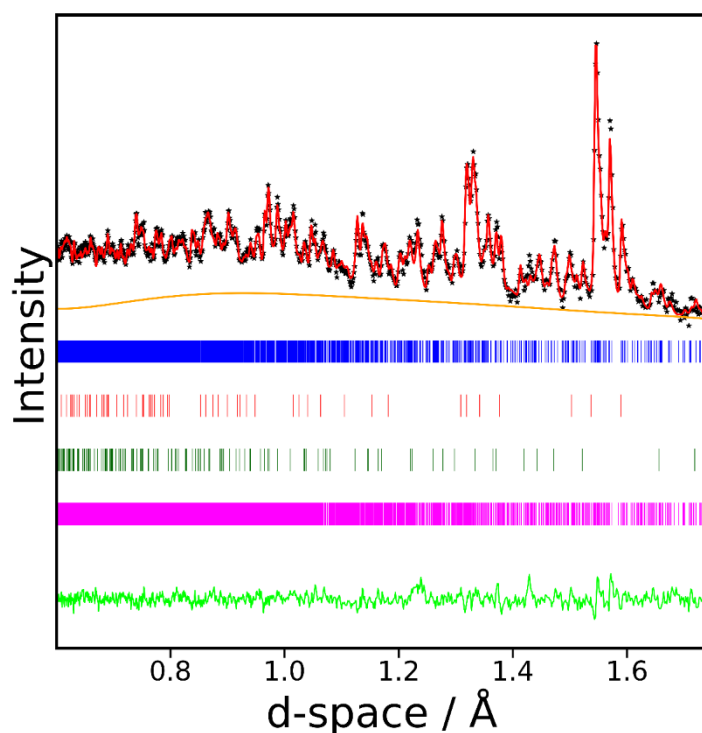
Figure S184: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 36 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 1.93 % and 2.25 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
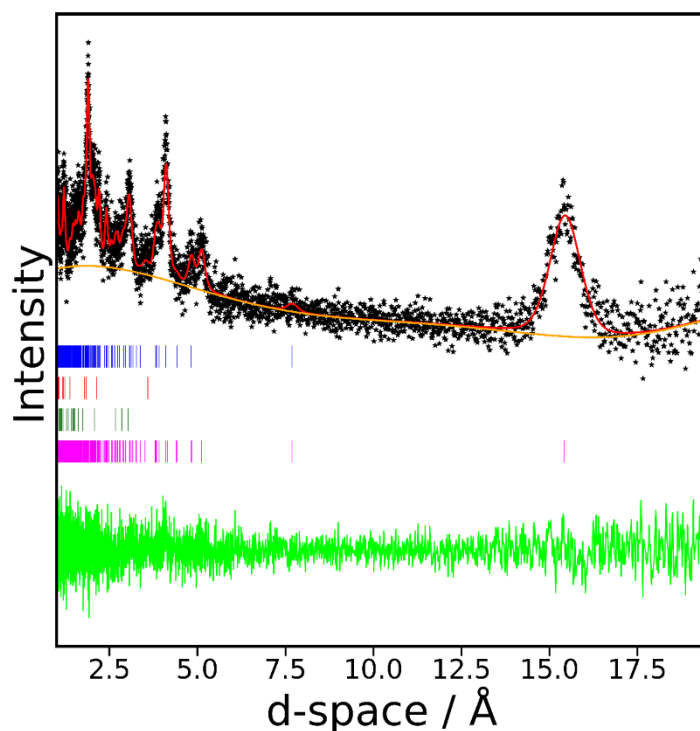
Figure S185: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 31 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 5.70 % and 6.30 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
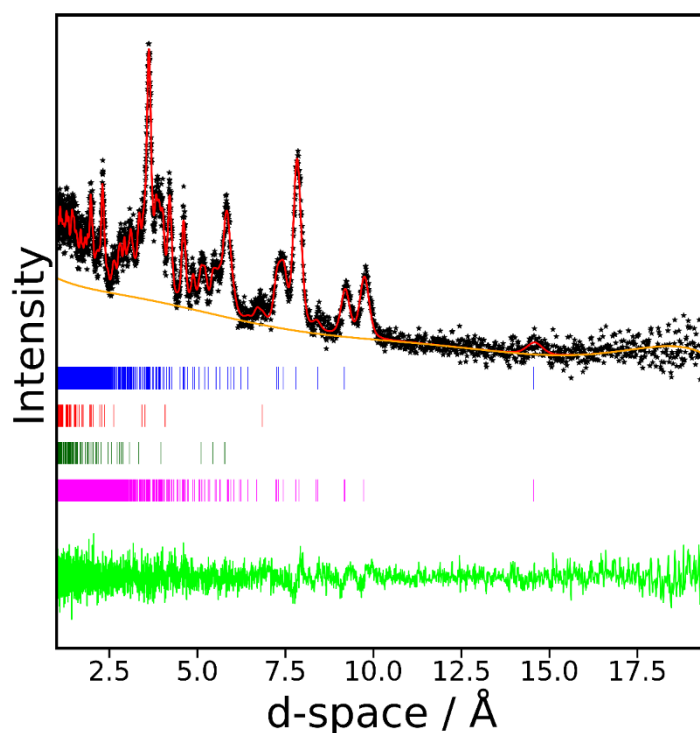
Figure S186: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 31 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.73 % and 4.15 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
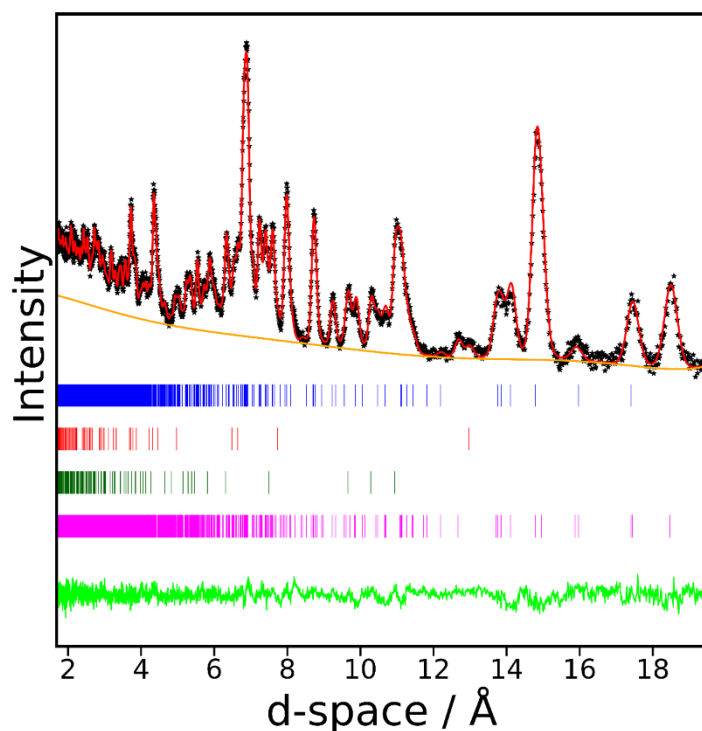
Figure S187: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 31 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.74 % and 2.89 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
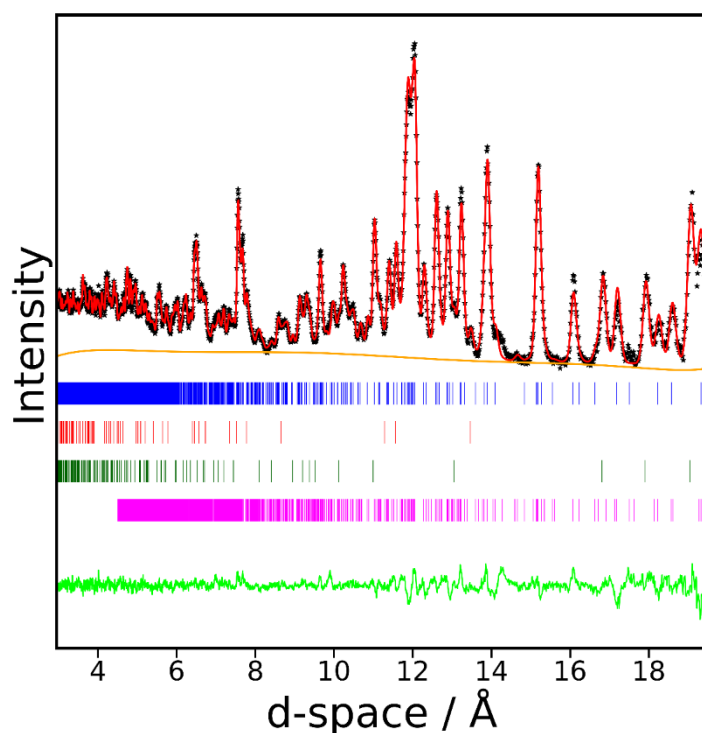
Figure S188: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 31 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.85 % and 2.88 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.

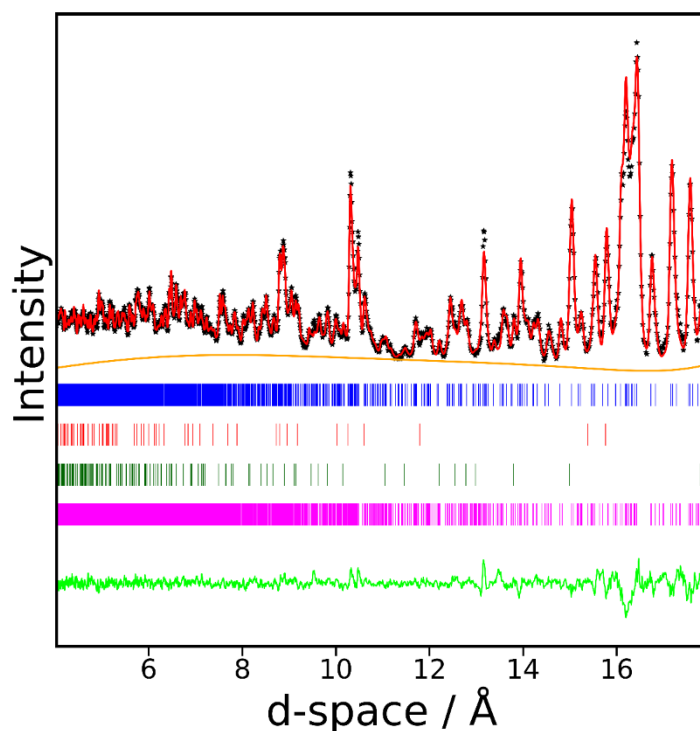**Figure S189:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 31 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.89 % and 3.01 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
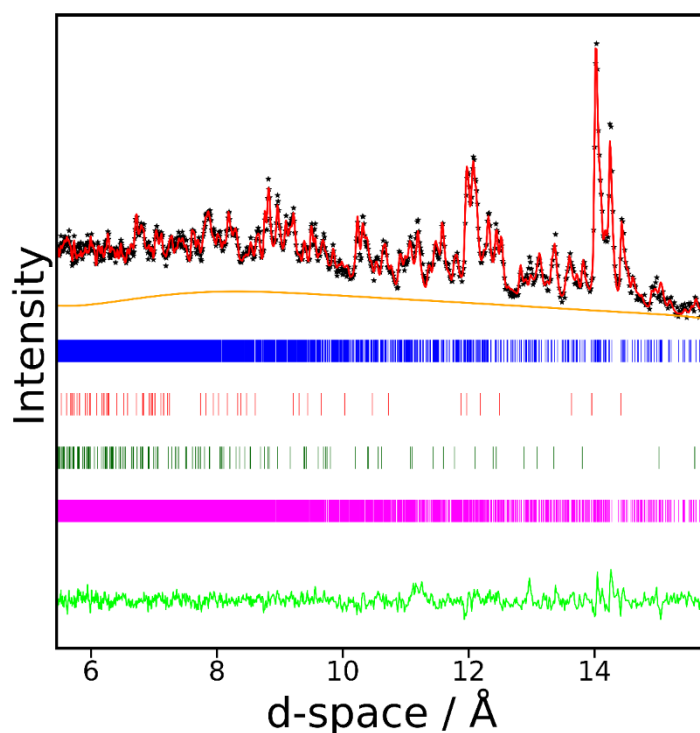
Figure S190: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 31 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.93 % and 2.27 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
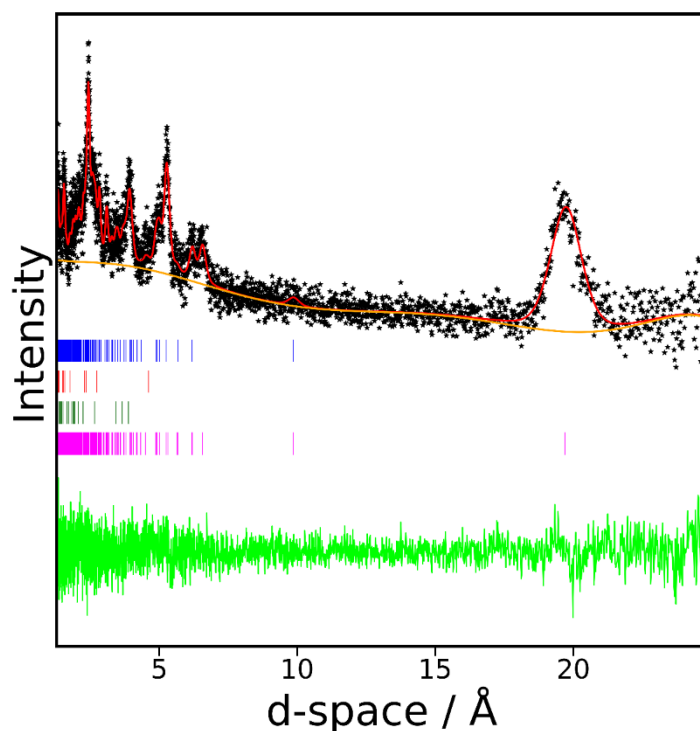
Figure S191: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 26 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 5.55 % and 6.33 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
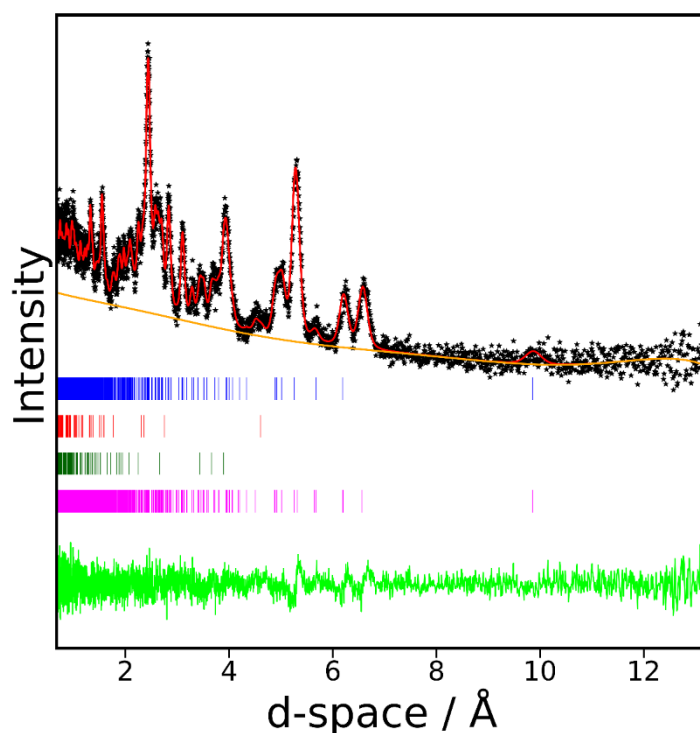
Figure S192: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 26 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.82 % and 4.27 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.

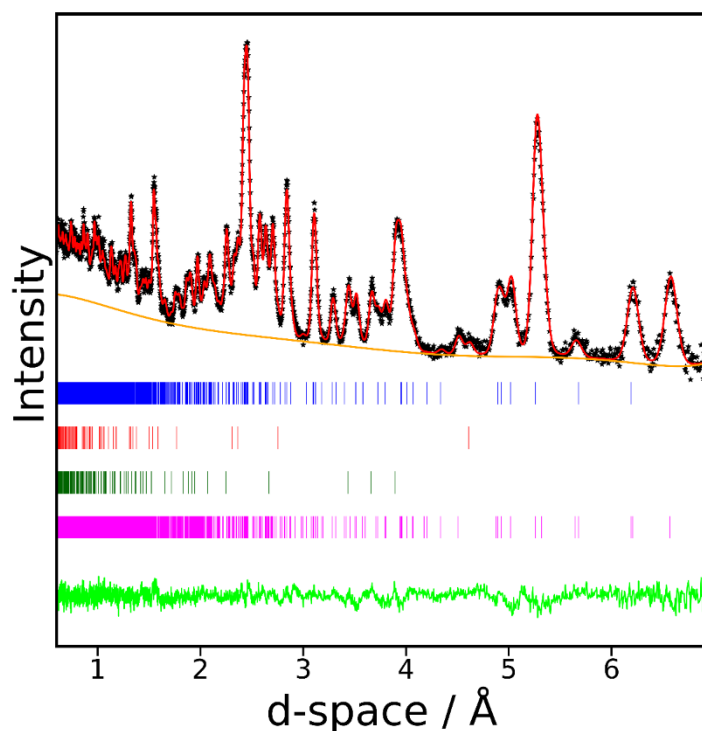**Figure S193:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 26 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.71 % and 2.89 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
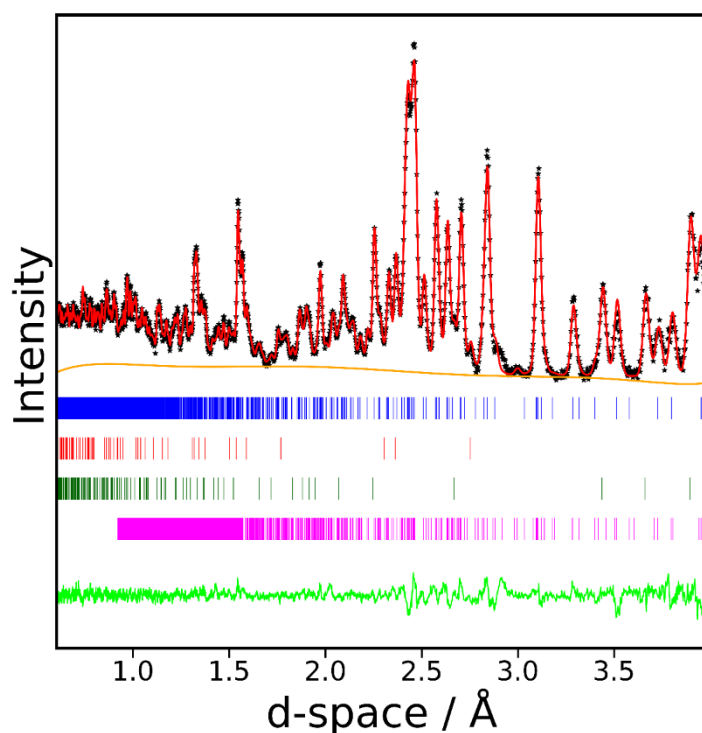
Figure S194: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 26 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.73 % and 2.86 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
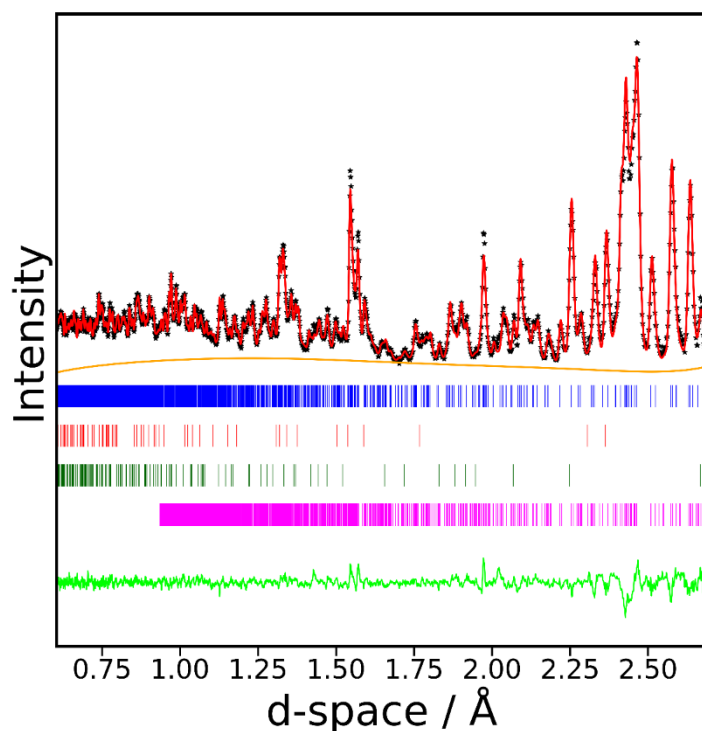
Figure S195: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 26 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.79 % and 2.98 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
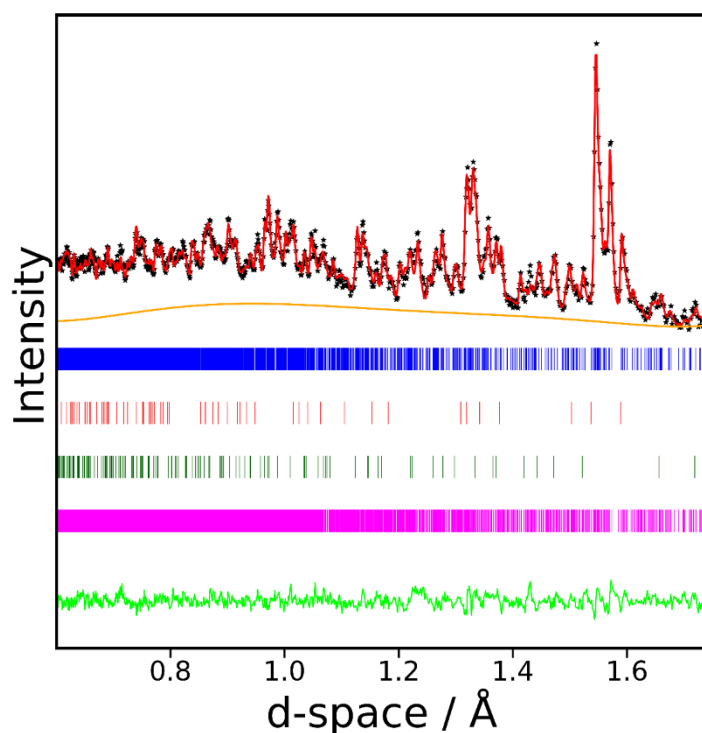
Figure S196: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 26 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.91 % and 2.25 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
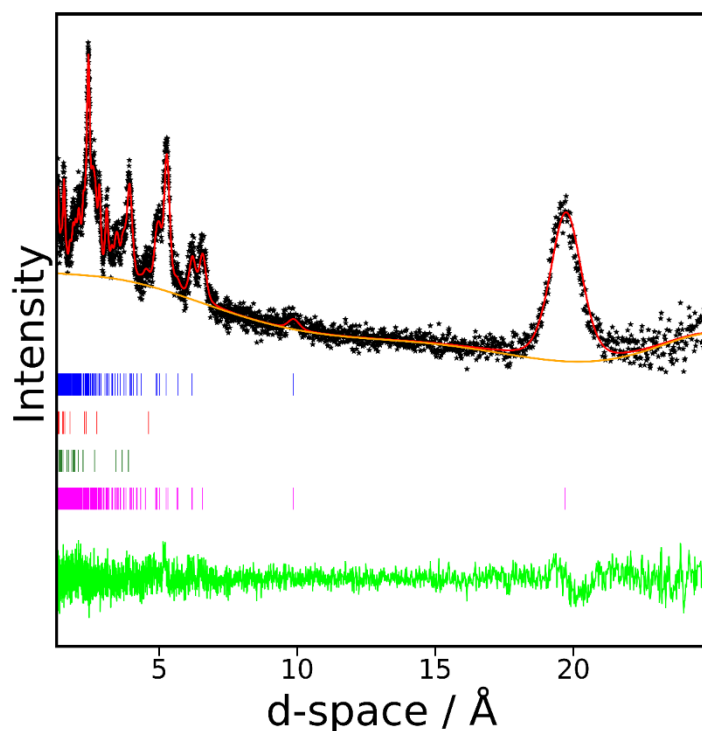
Figure S197: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 21 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.15 % and 3.43 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
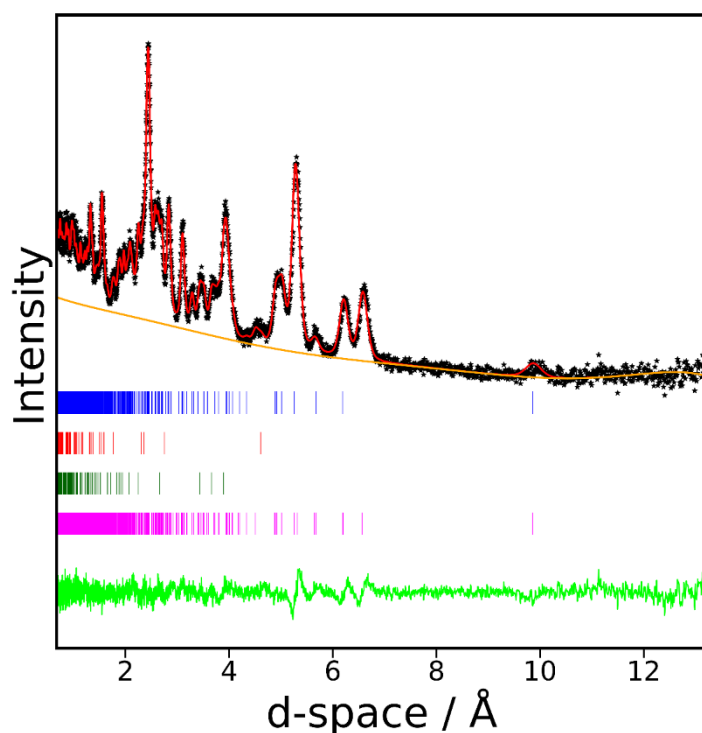
Figure S198: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 21 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.33 % and 2.65 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
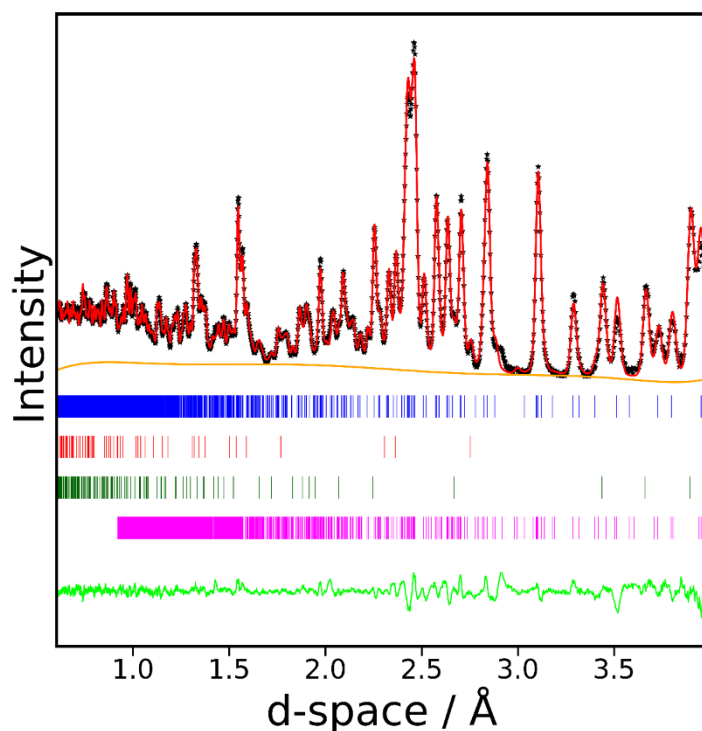
Figure S199: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 21 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.05 % and 2.12 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

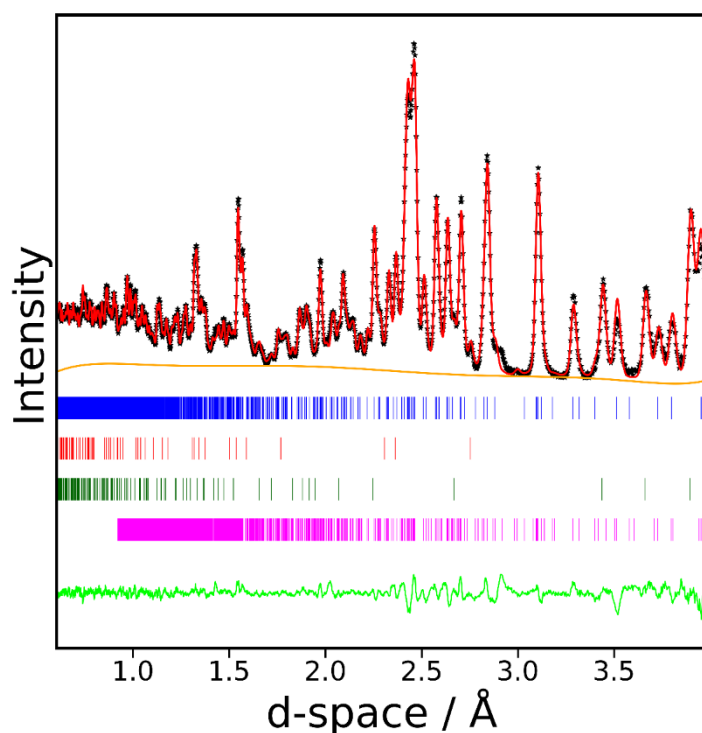**Figure S200:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 21 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.38 % and 2.48 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
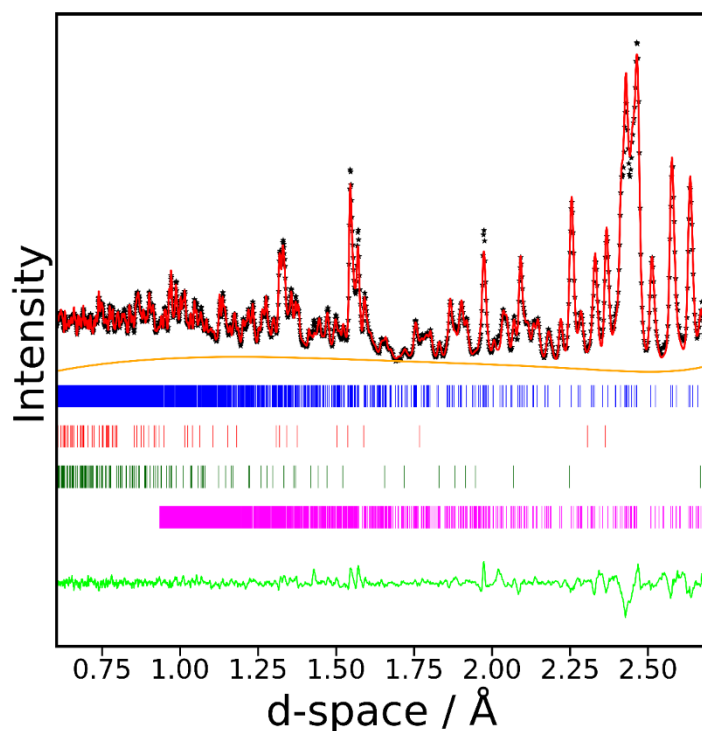
Figure S201: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 21 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.43 % and 2.60 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
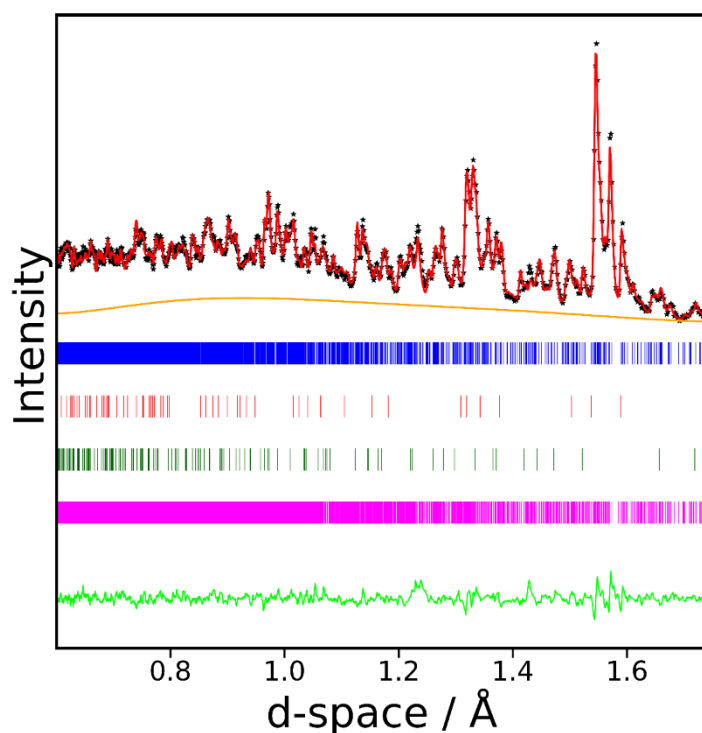
Figure S202: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 21 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.53 % and 1.86 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
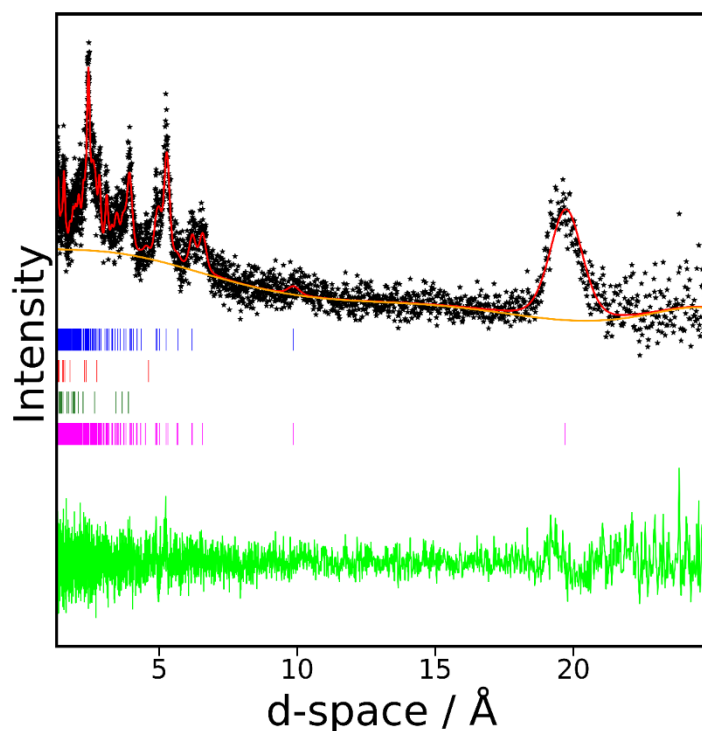
Figure S203: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 18 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 5.68 % and 6.29 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
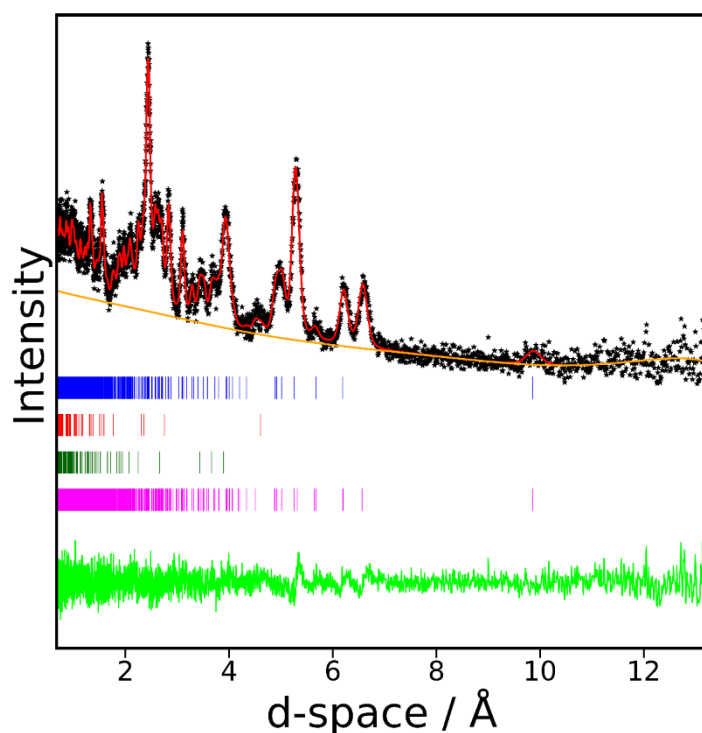
Figure S204: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 18 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.789 % and 4.13 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
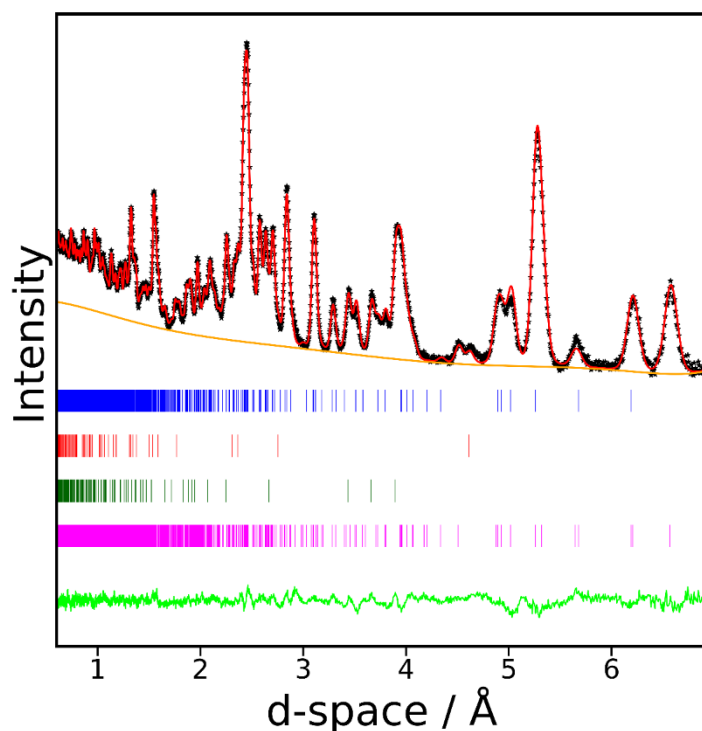
Figure S205: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 18 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.75 % and 2.94 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
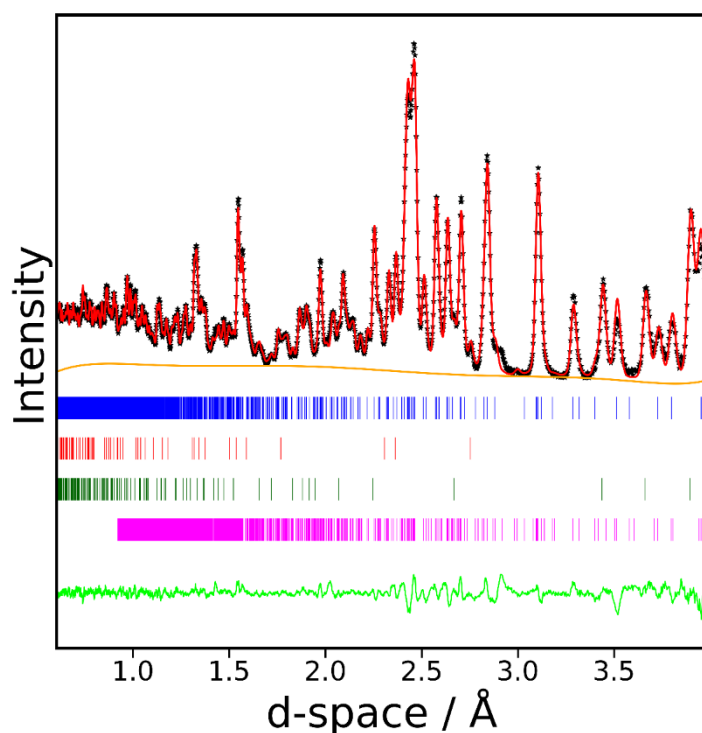
Figure S206: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 18 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.94 % and 2.90 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

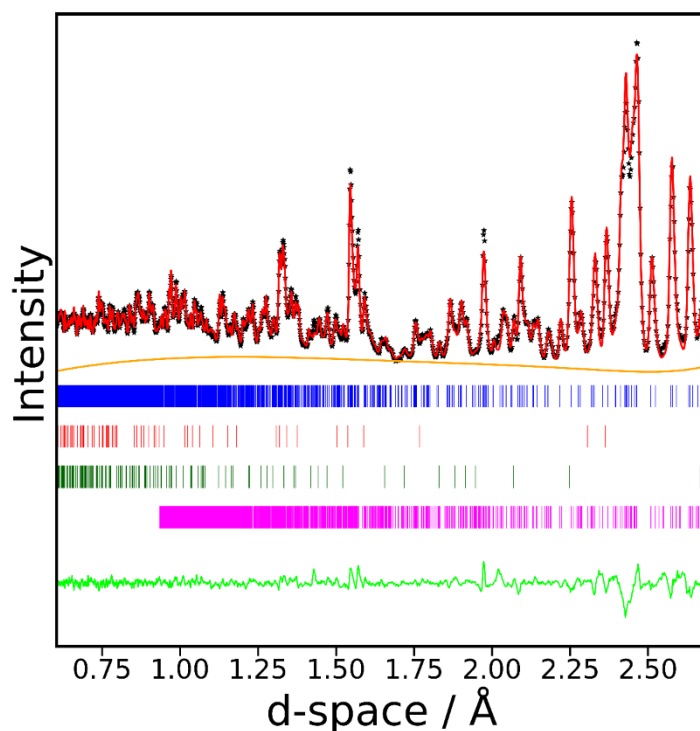**Figure S207:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 18 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.79 % and 2.97 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

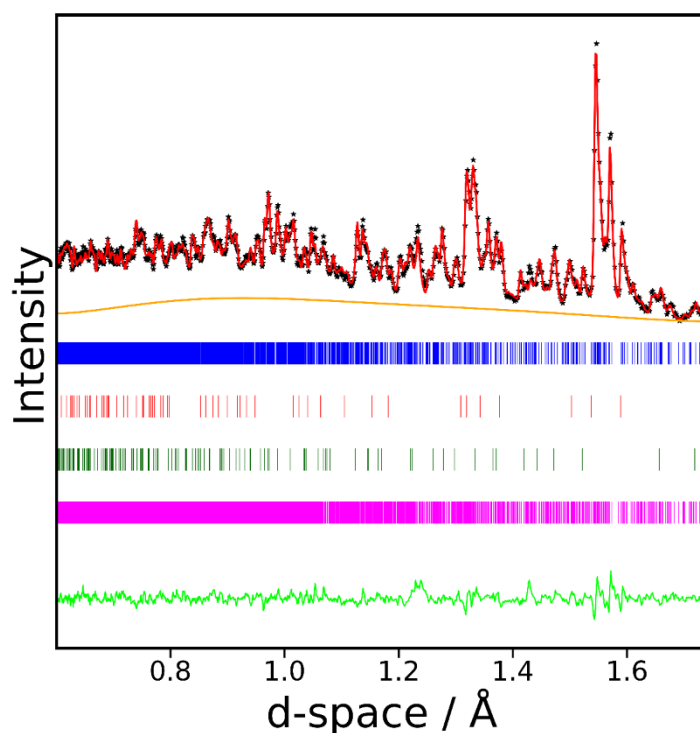**Figure S208:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 18 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.85 % and 2.22 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
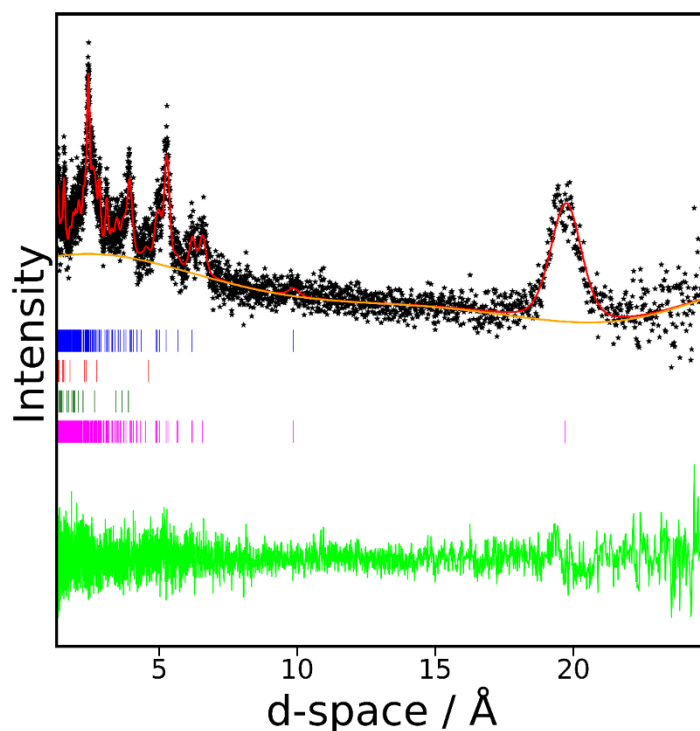
Figure S209: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 16 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 5.81 % and 6.37 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
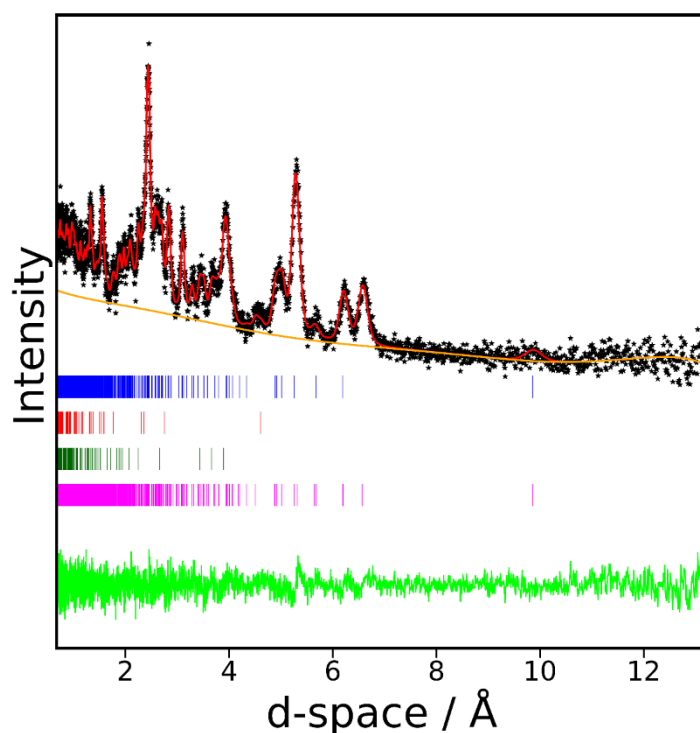
Figure S210: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 16 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.80 % and 4.25 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.

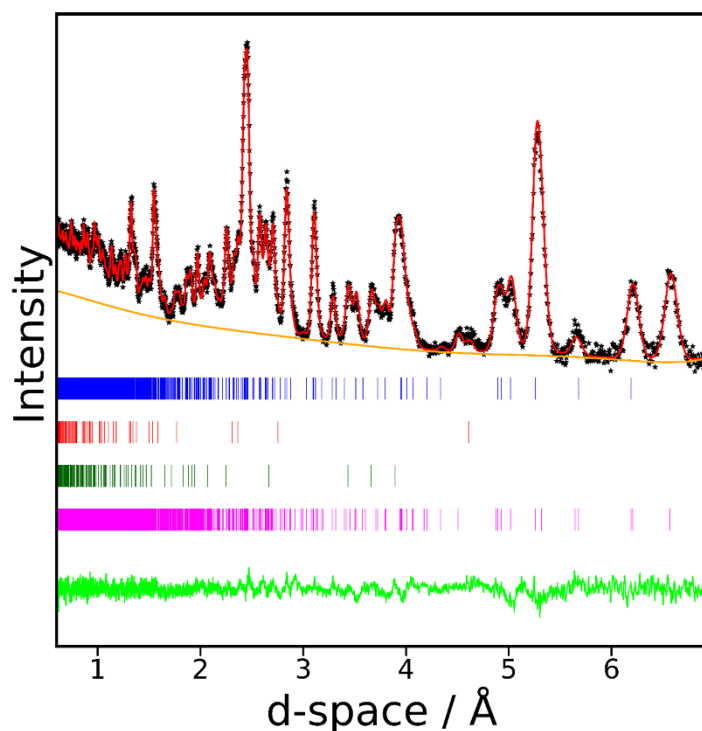**Figure S211:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 16 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.81 % and 2.94 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

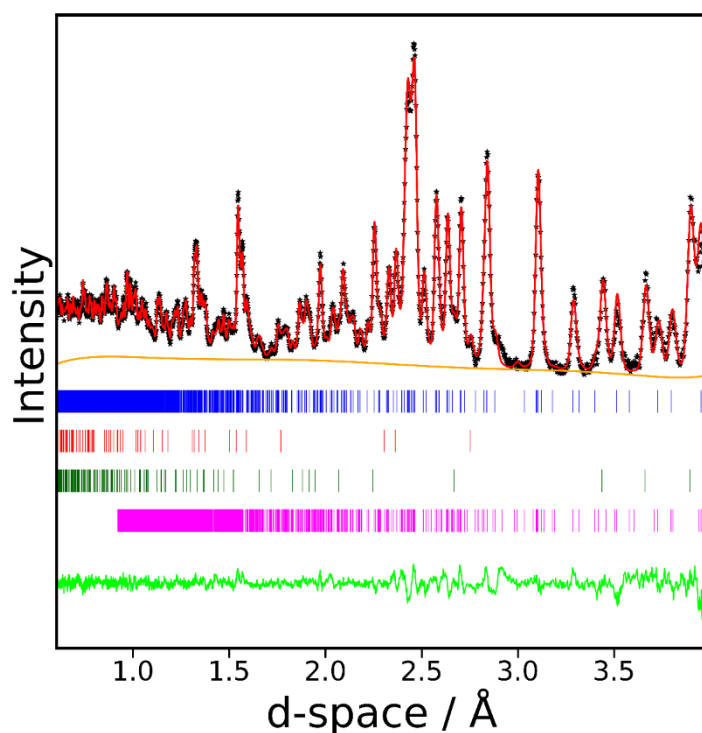**Figure S212:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 16 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.79 % and 2.83 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
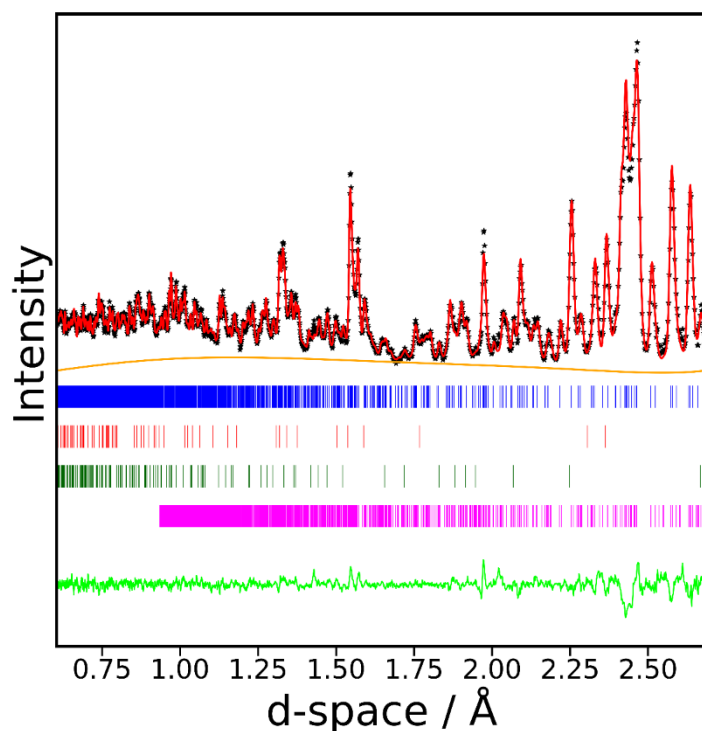
Figure S213: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 16 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.83 % and 3.01 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

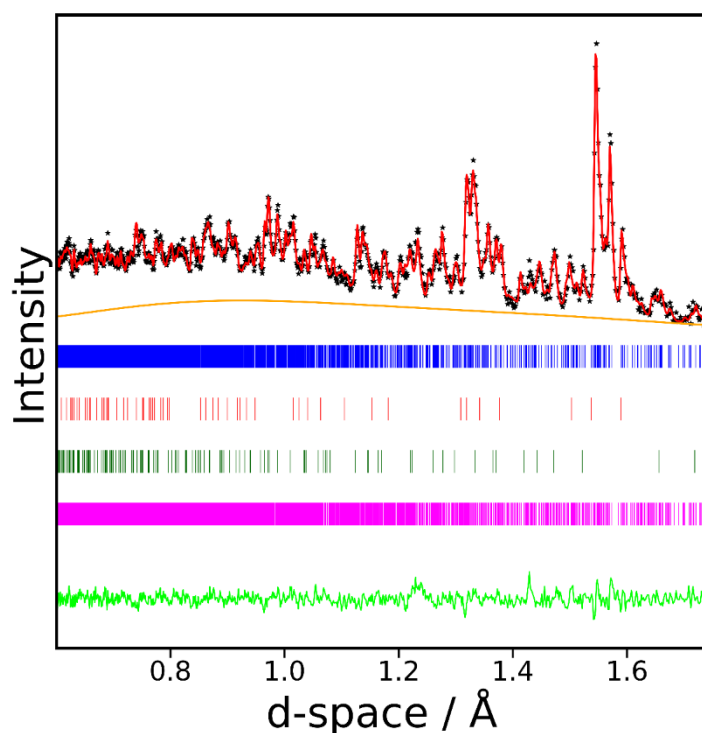**Figure S214:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 16 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.96 % and 2.33 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
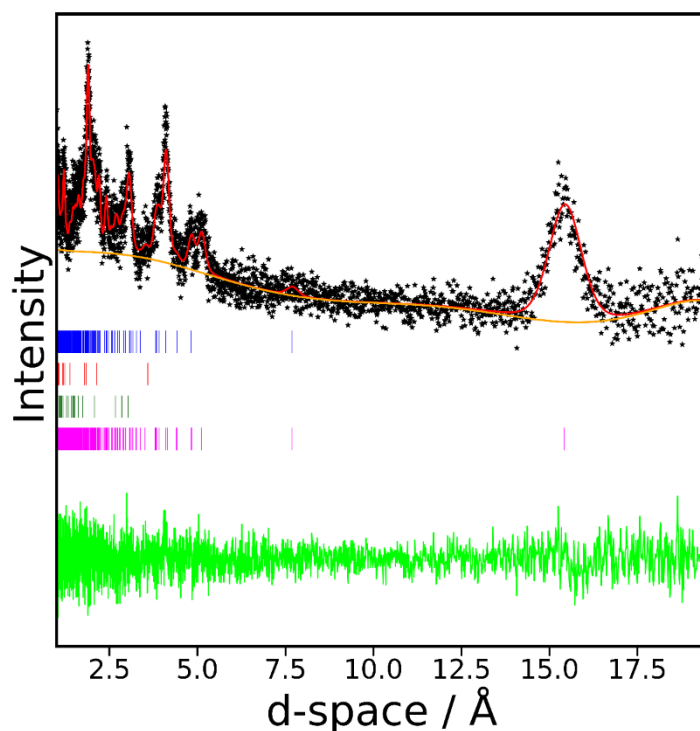
Figure S215: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 14 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 5.66 % and 6.39 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
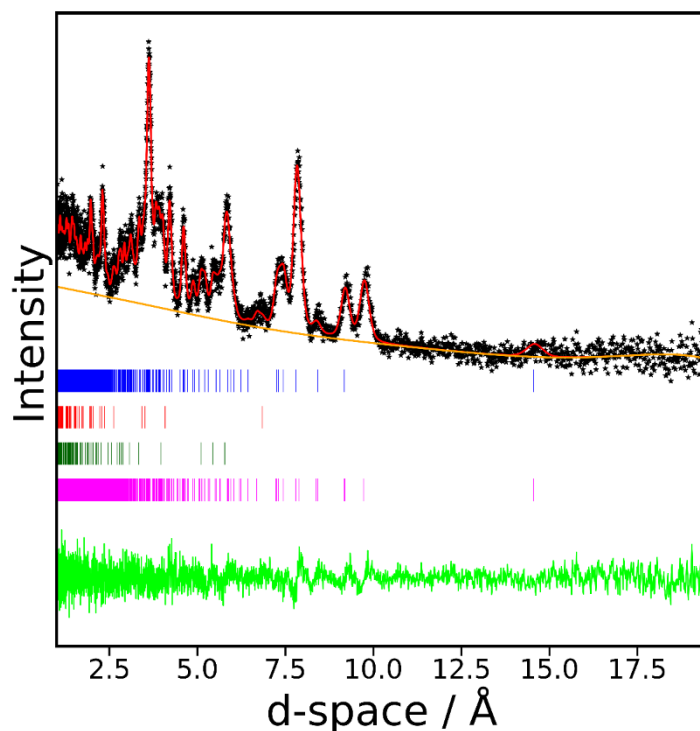
Figure S216: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 14 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.87 % and 4.40 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.

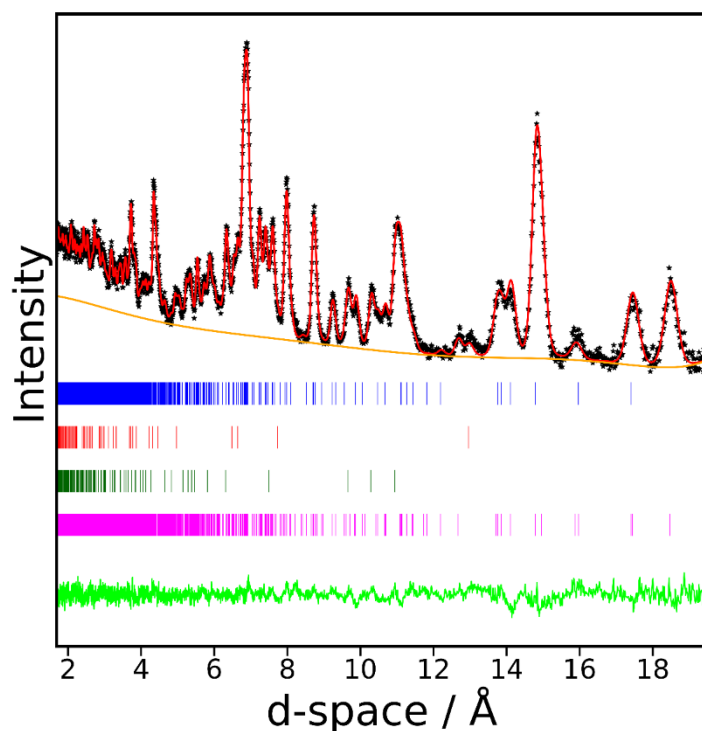**Figure S217:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 14 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.82 % and 2.90 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

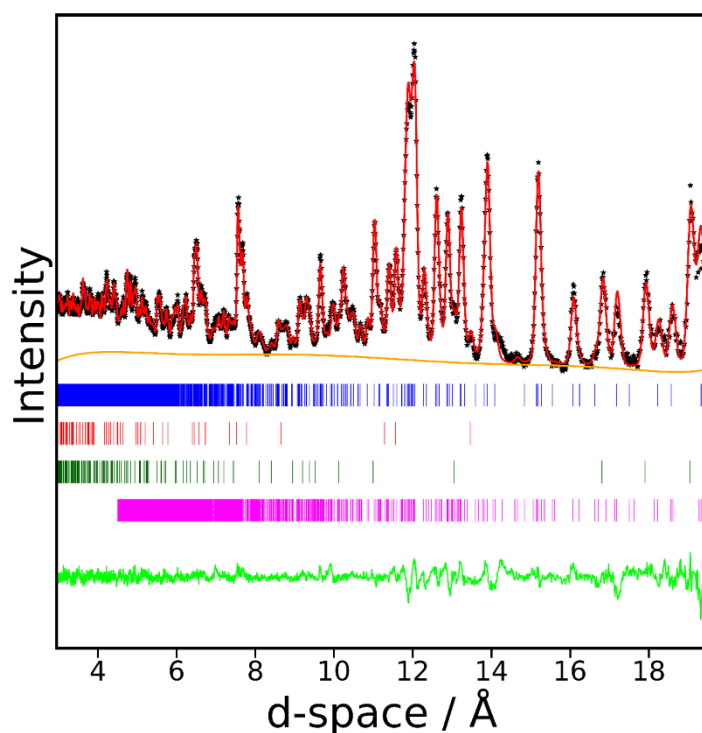**Figure S218:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 14 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.95 % and 2.97 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
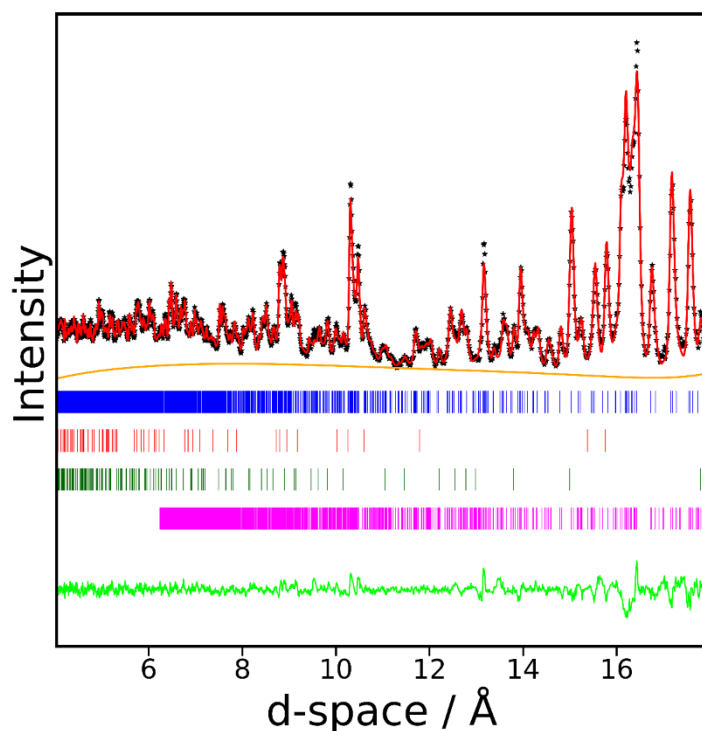
Figure S219: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 14 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.86 % and 3.06 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
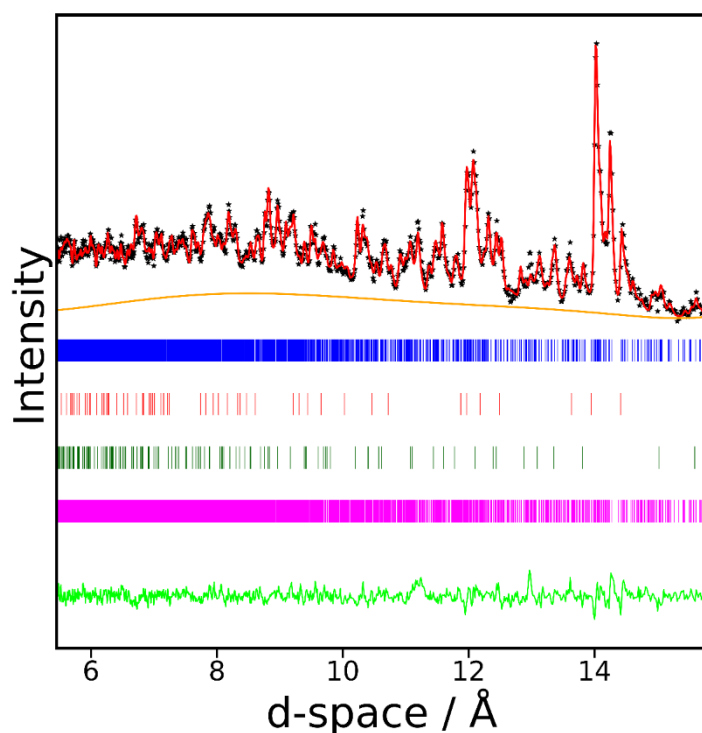
Figure S220: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 14 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.90 % and 2.27 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
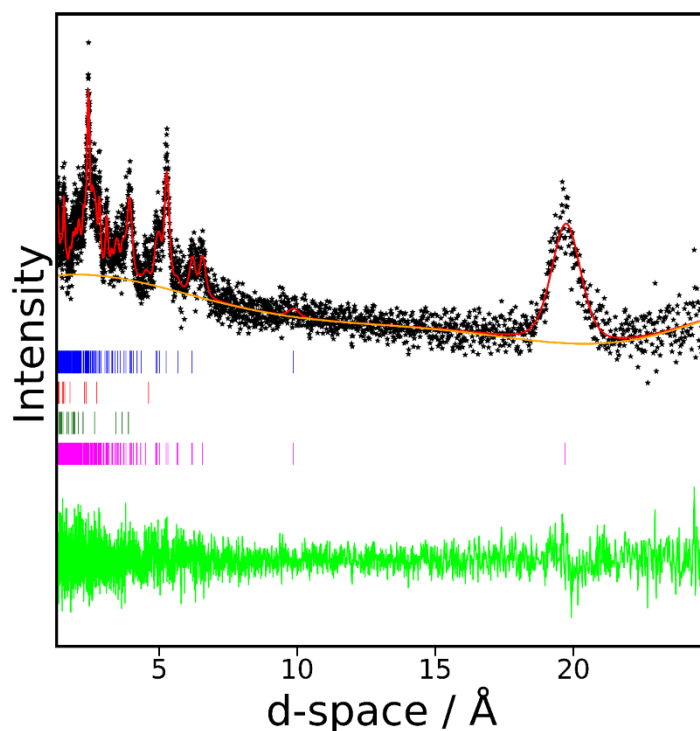
Figure S221: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 13 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 5.59 % and 6.37 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
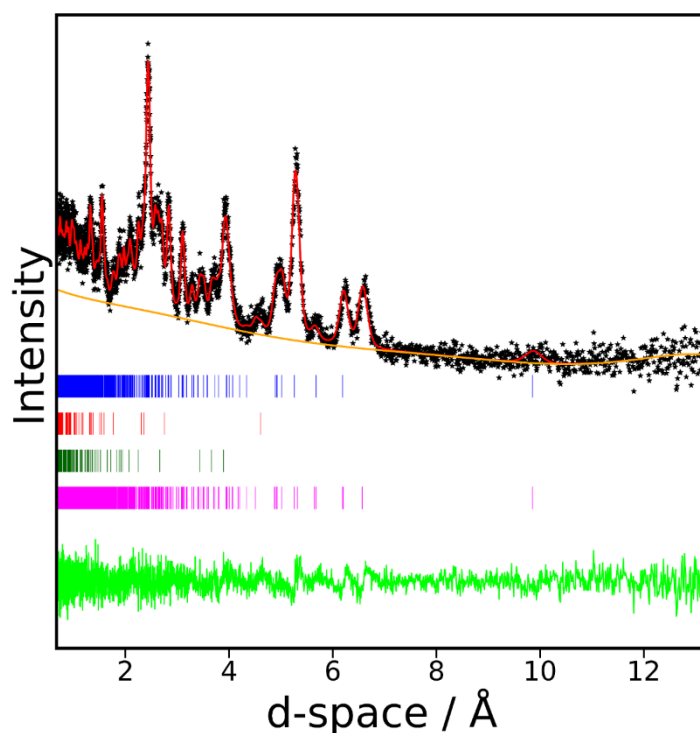
Figure S222: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 13 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 3.91 % and 4.31 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
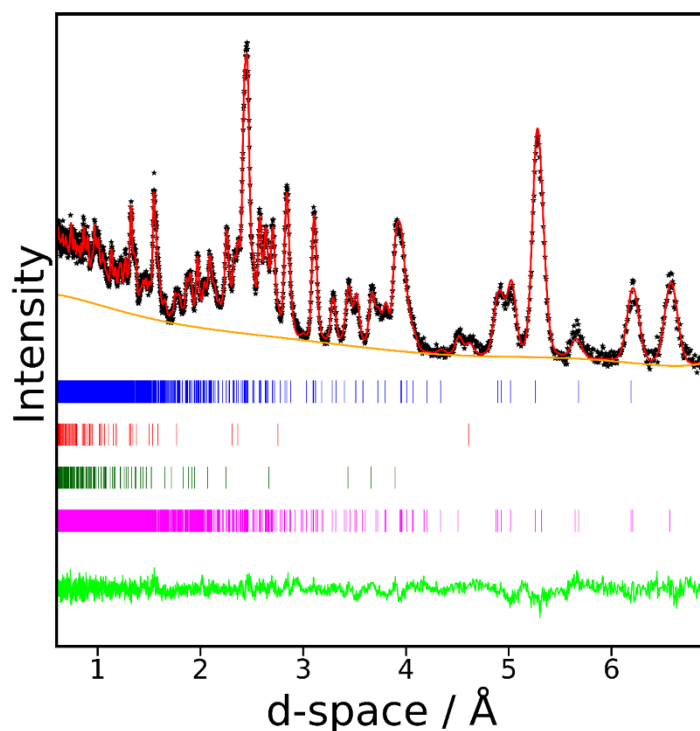
Figure S223: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 13 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.70 % and 2.85 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

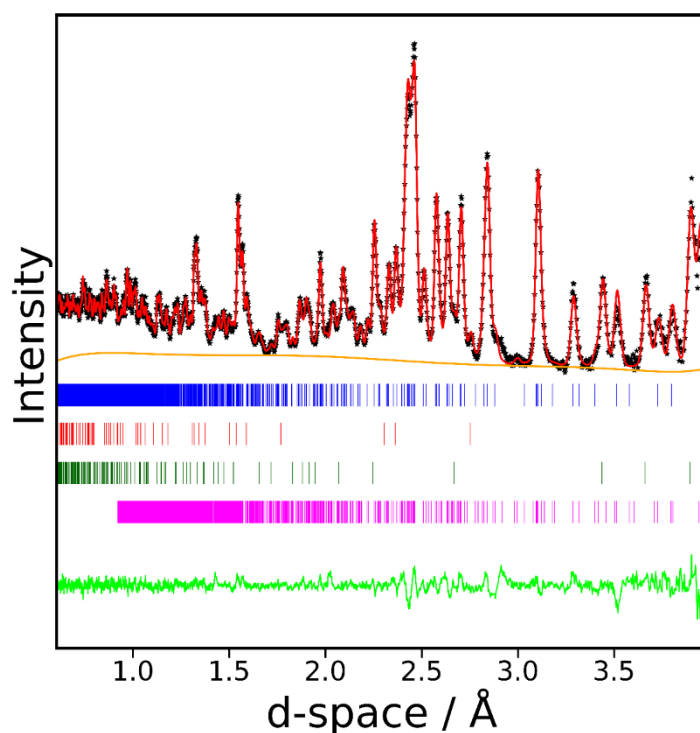**Figure S224:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 13 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.86 % and 2.86 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
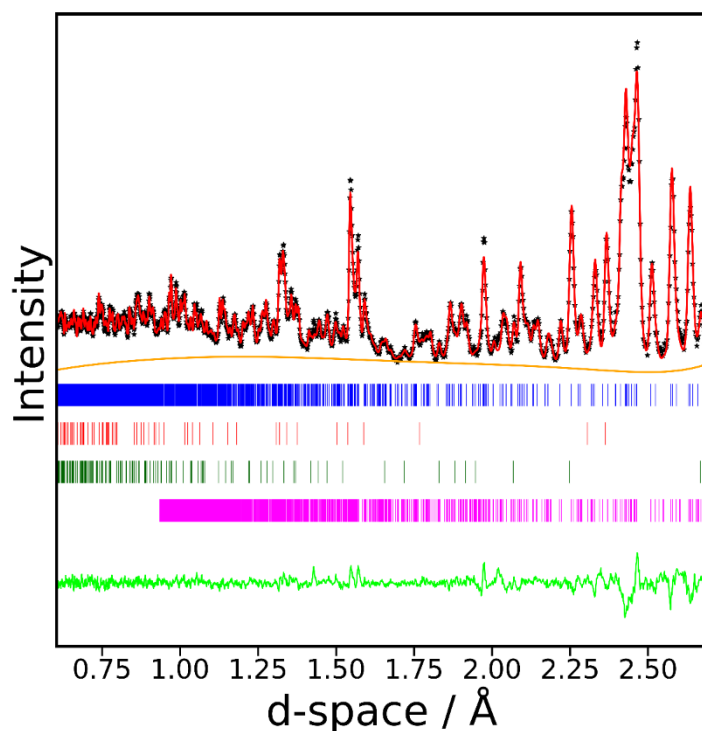
Figure S225: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 13 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 2.98 % and 3.07 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
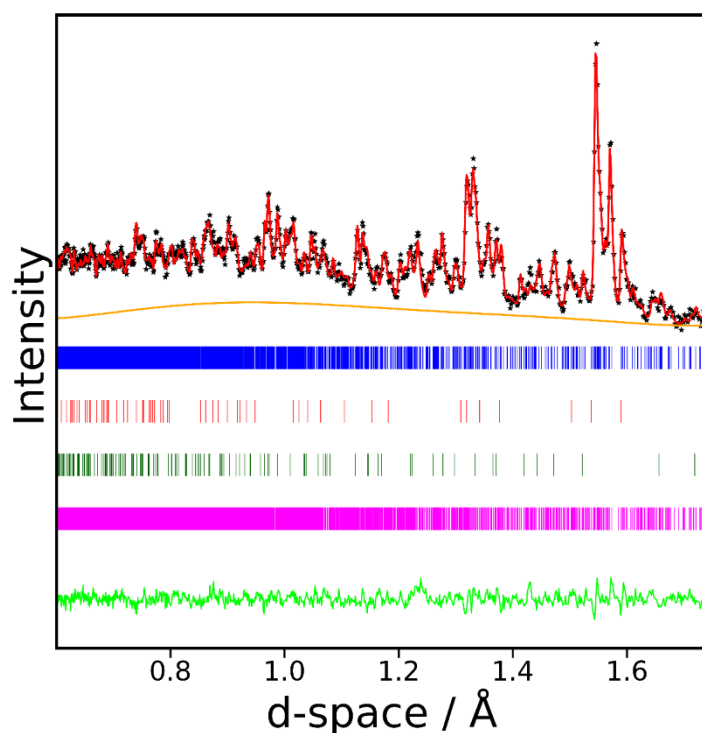
Figure S226: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 13 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_wp of 1.87 % and 2.22 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
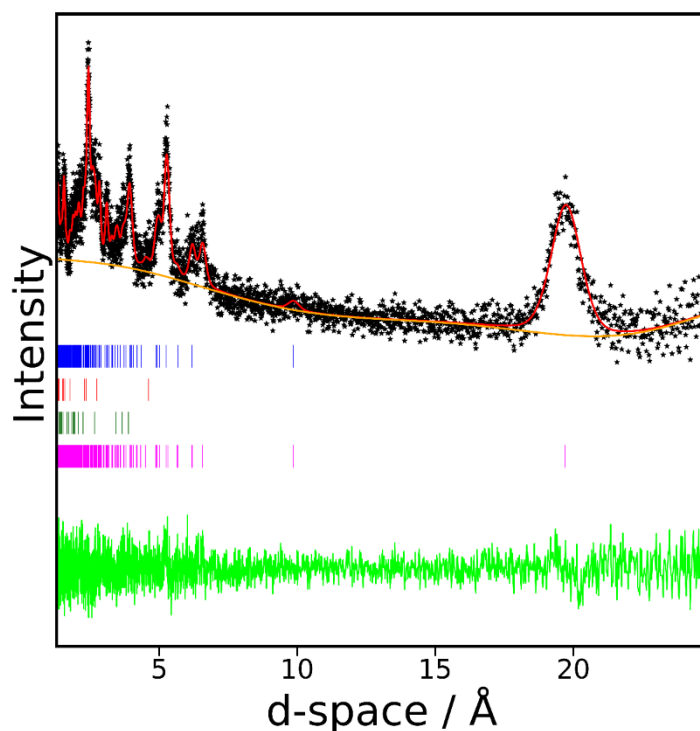
Figure S227: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 12 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 5.51 % and 4.91 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
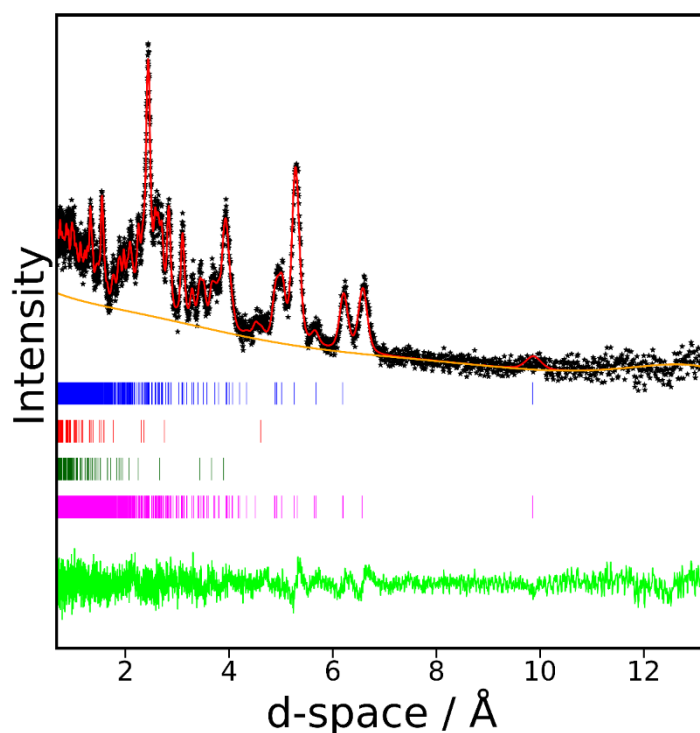
Figure S228: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 12 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.40 % and 3.86 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.

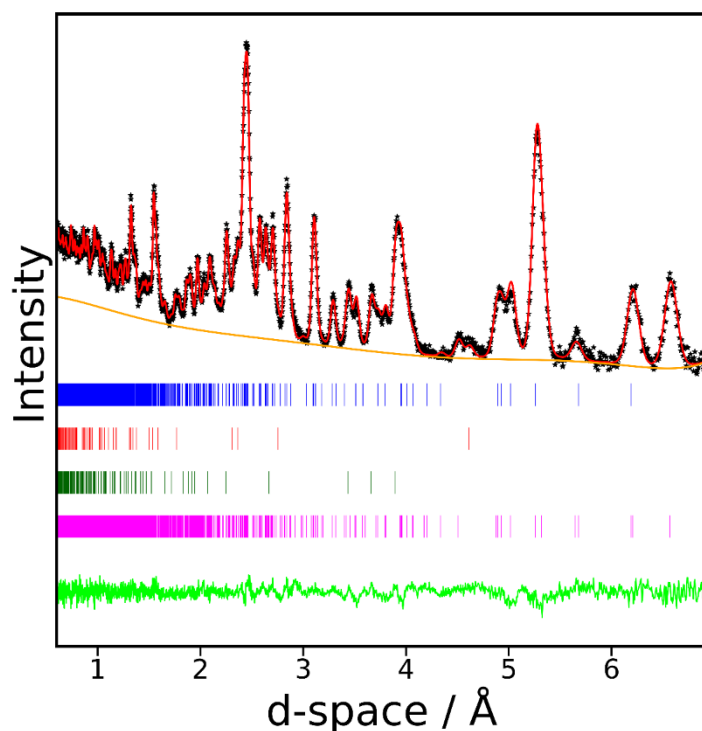**Figure S229:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 12 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.61 % and 2.71 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

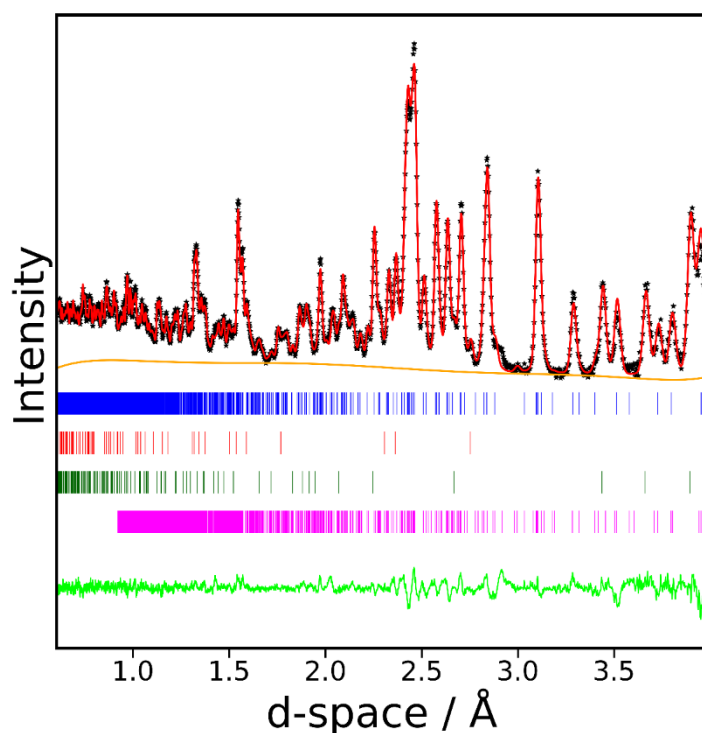**Figure S230:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 12 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.68 % and 2.75 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
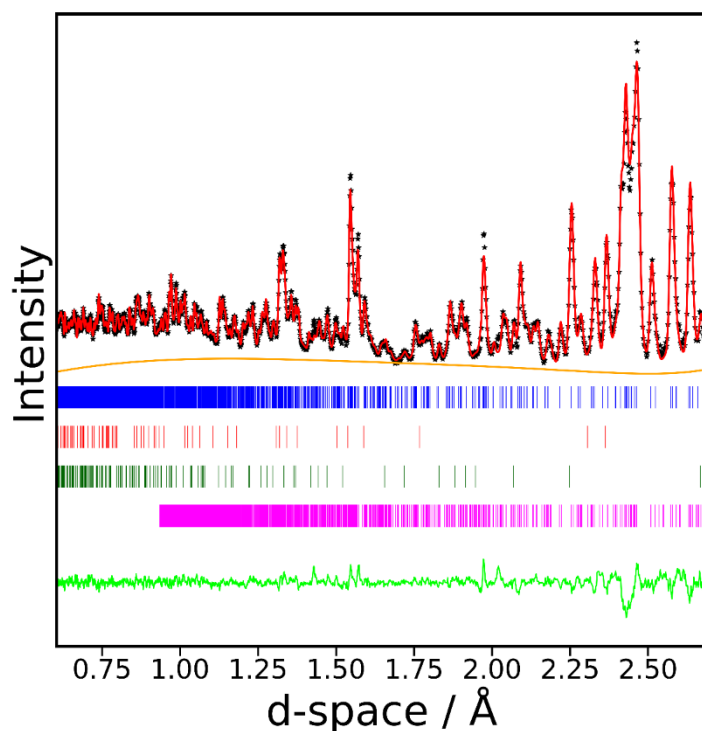
Figure S231: Neutron diffraction pattern collected from [Li(C₂O₄)]₂[Co₅(OD)₈] at 12 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.80 % and 2.98 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C₂O₄)]₂[Co₅(OD)₈], Co(OD)₂ , D₂O and the magnetic phases, respectively.
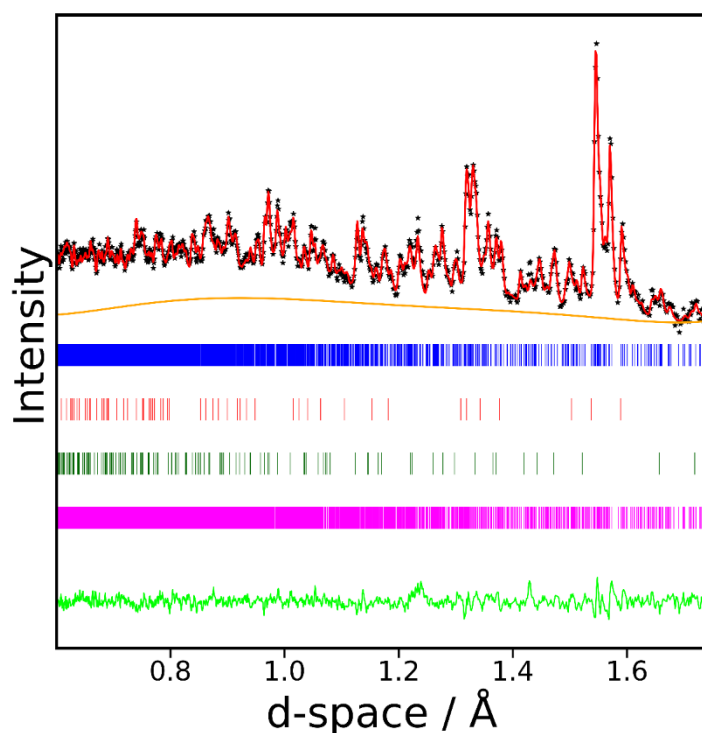
Figure S232: Neutron diffraction pattern collected from [Li(C₂O₄)]₂[Co₅(OD)₈] at 12 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.80 % and 2.12 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C₂O₄)]₂[Co₅(OD)₈], Co(OD)₂ , D₂O and the magnetic phases, respectively.
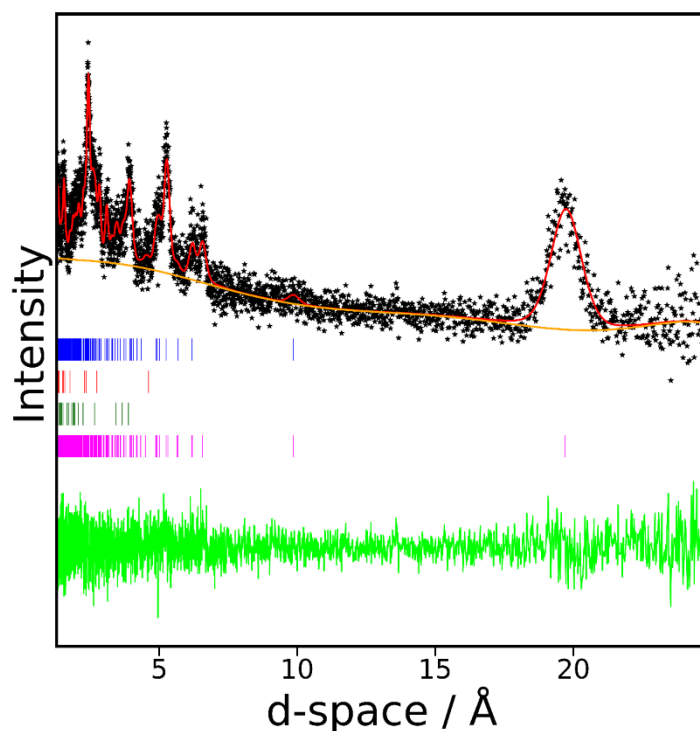
Figure S233: diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 11 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 5.66 % and 6.33 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
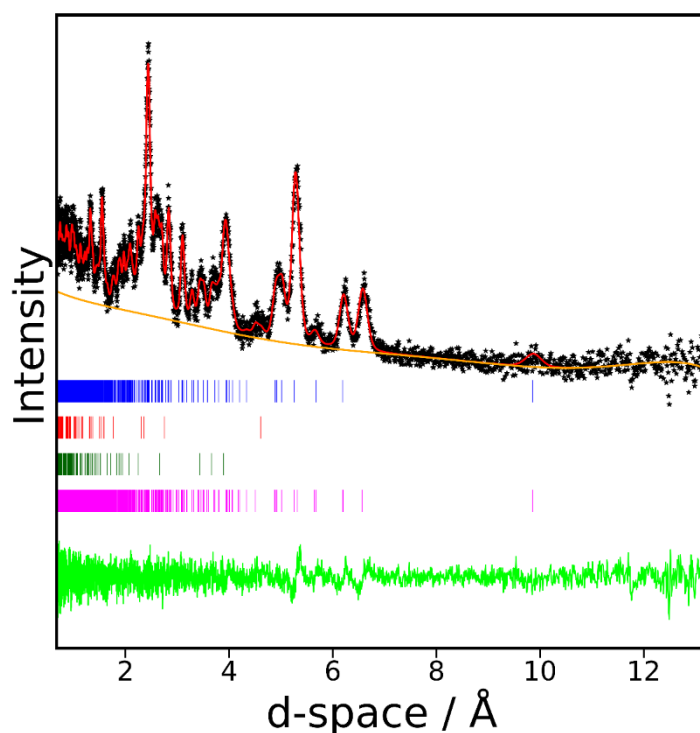
Figure S234: Neutron diffraction pattern collected from [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$] at 11 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.61 % and 4.14 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C$_2$O$_4$)]$_2$[Co$_5$(OD)$_8$], Co(OD)$_2$, D$_2$O and the magnetic phases, respectively.
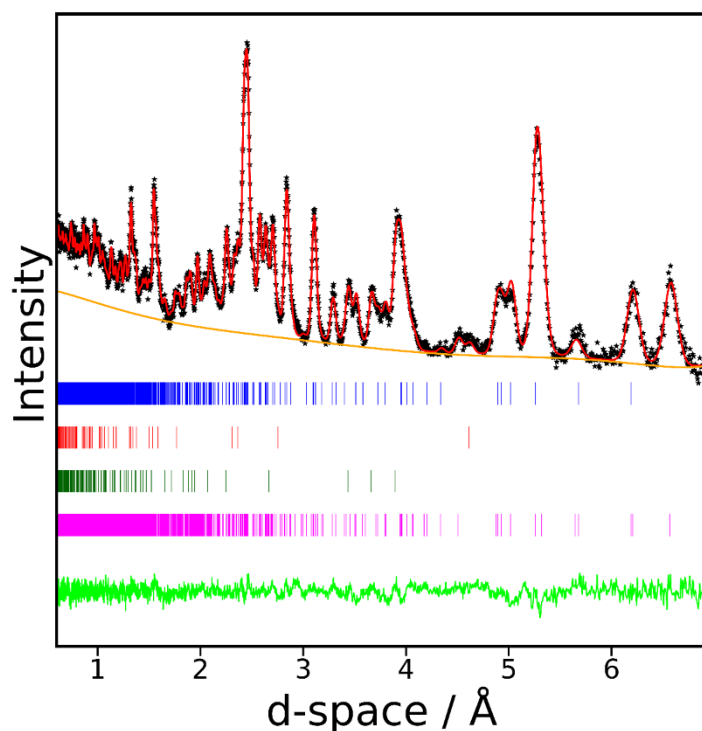
Figure S235: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 11 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.80 % and 2.95 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

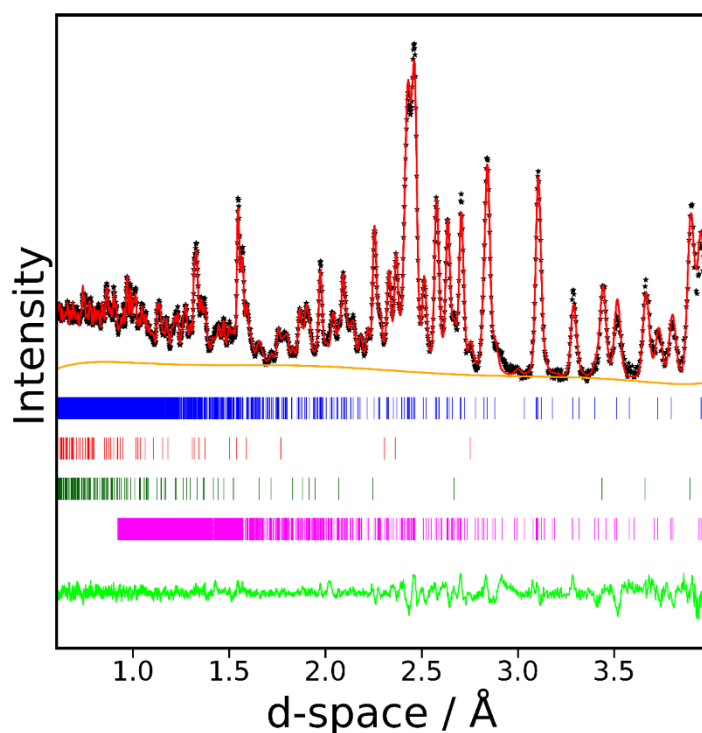**Figure S236:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 11 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.86 % and 2.88 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
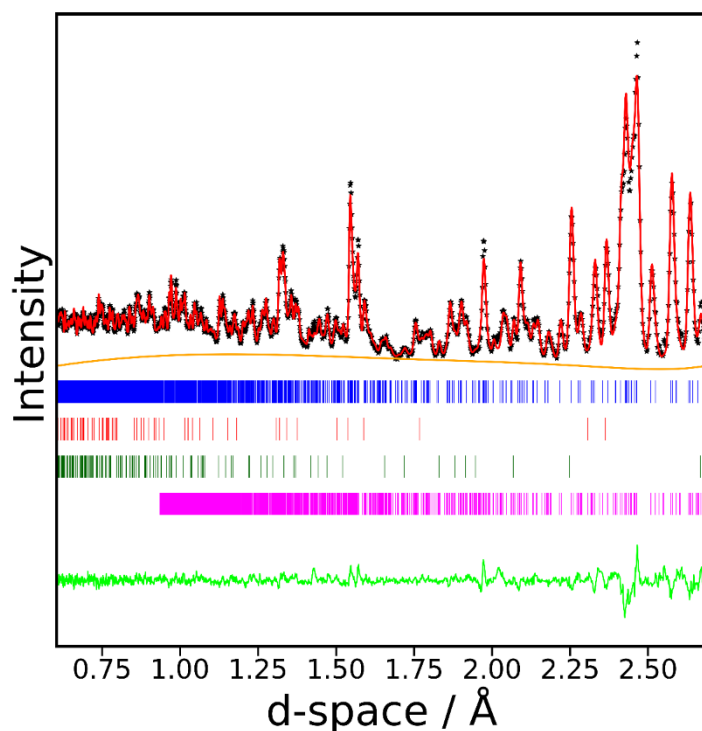
Figure S237: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 11 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.85 % and 3.00 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

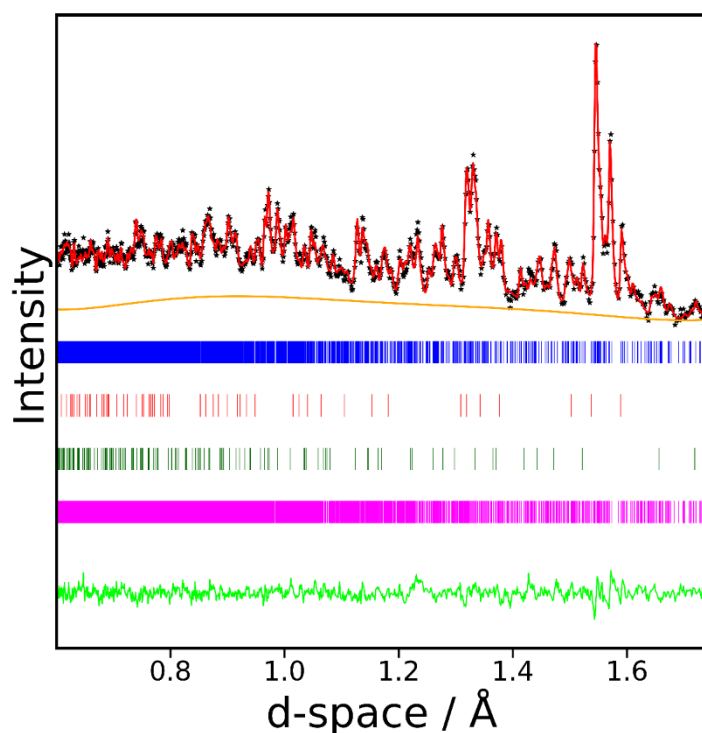**Figure S238:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 11 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.89 % and 2.24 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
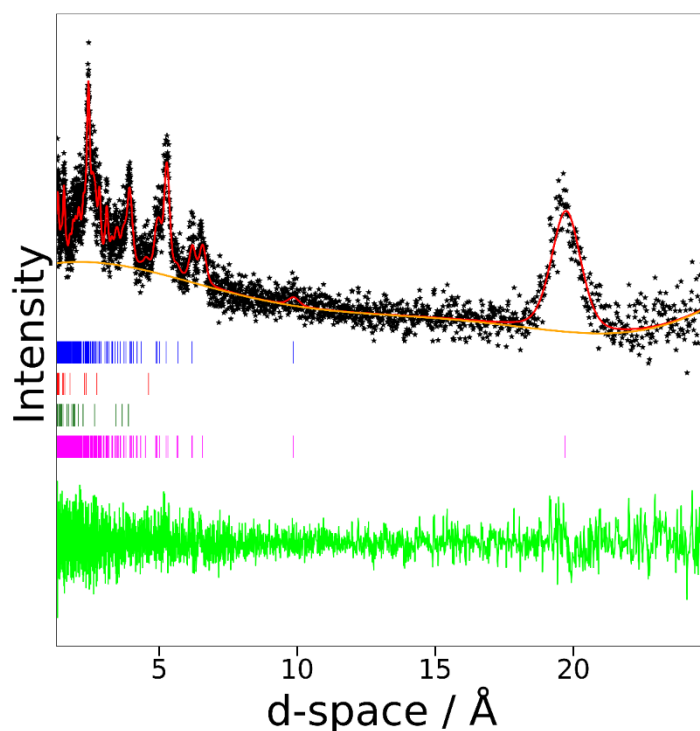
Figure S239: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 10 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 5.47 % and 6.23 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

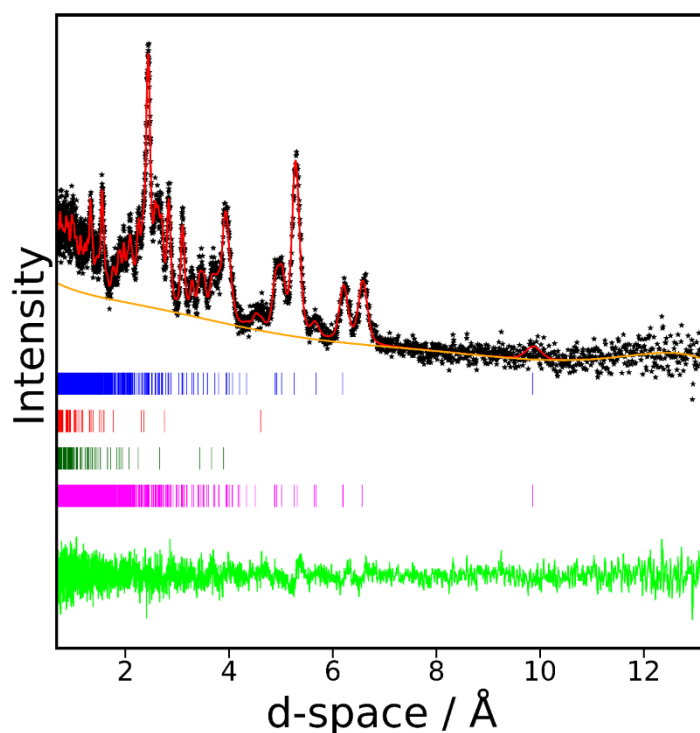**Figure S240:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 10 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.67 % and 4.13 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
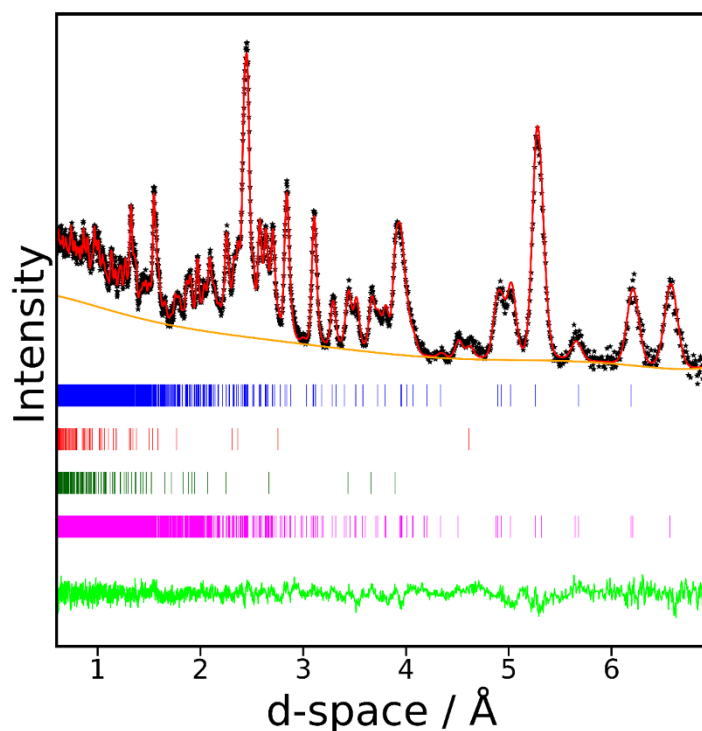
Figure S241: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 10 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.77 % and 2.89 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

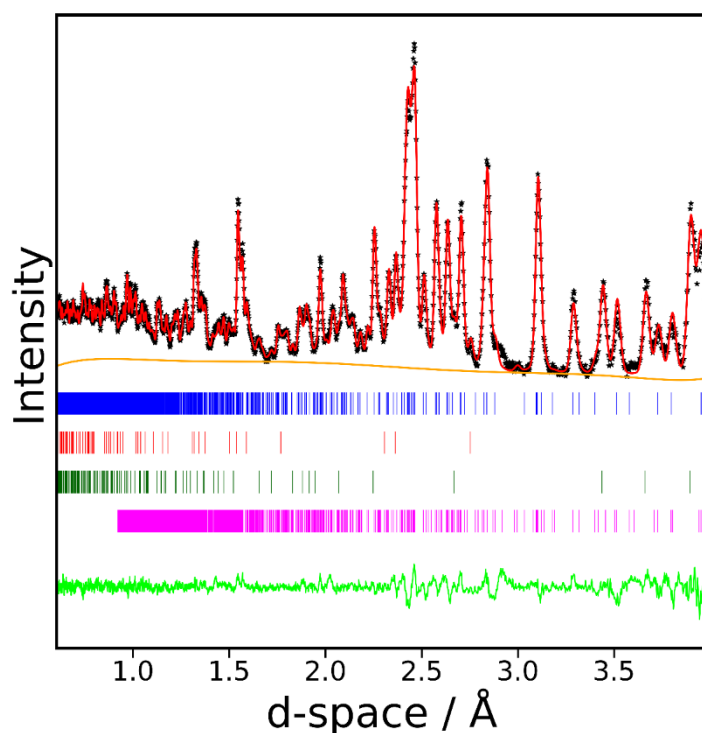**Figure S242:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 10 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.89 % and 2.93 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

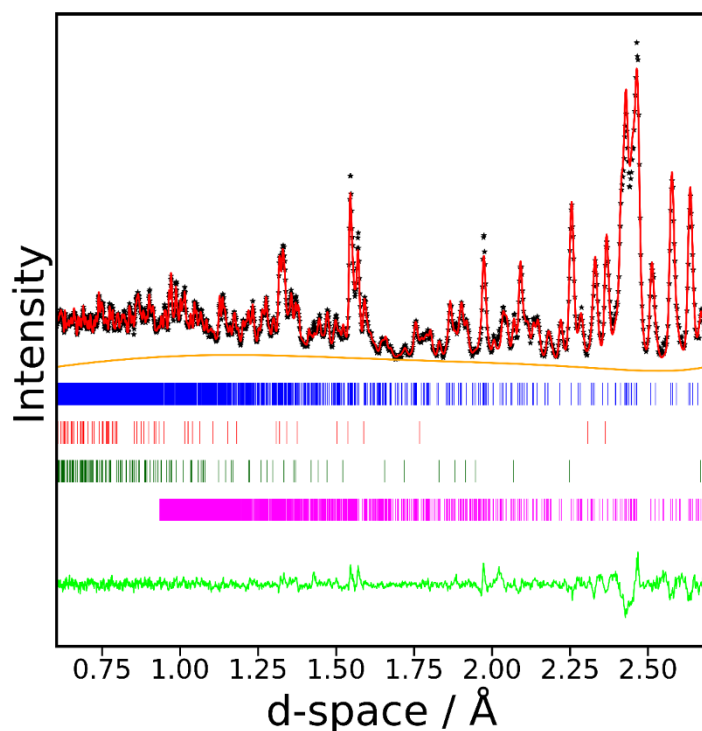**Figure S243:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 10 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.87 % and 3.01 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

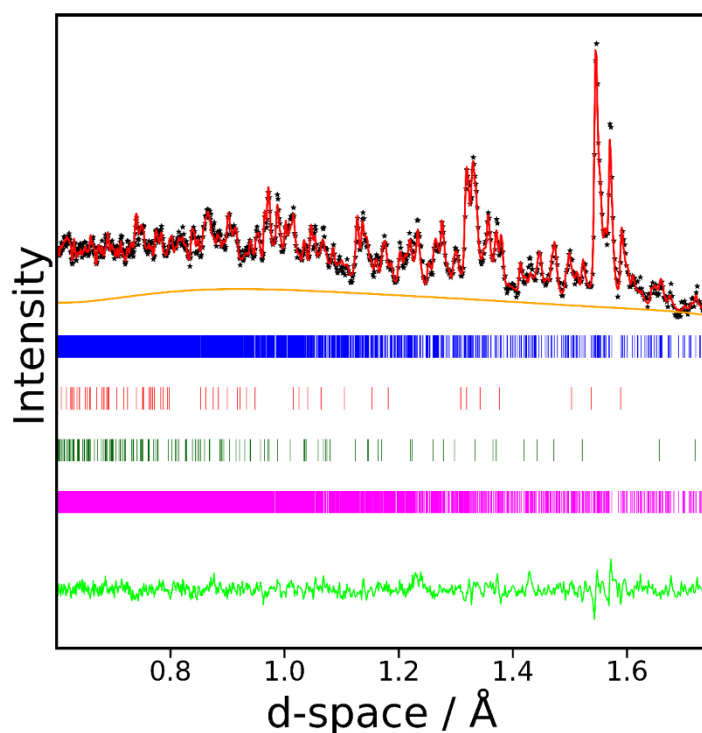**Figure S244:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 10 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.98 % and 2.33 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
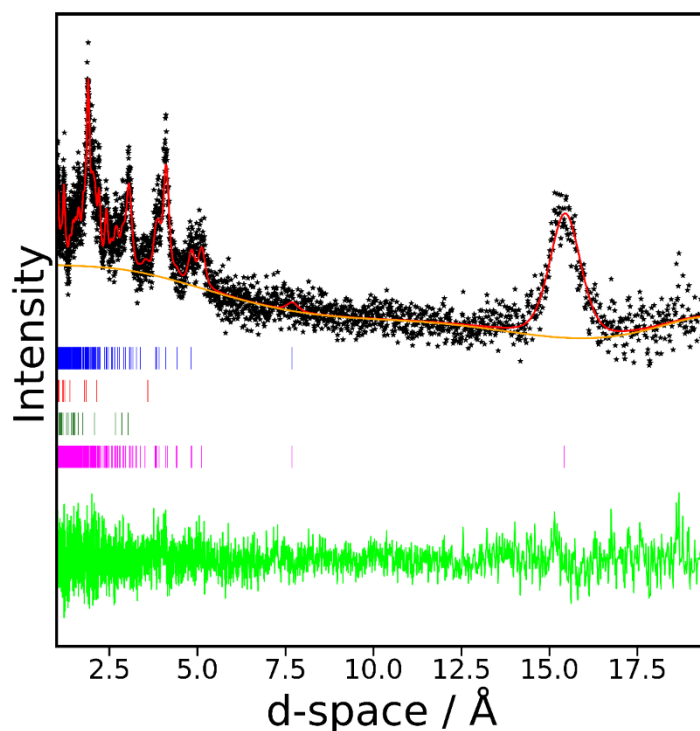
Figure S245: Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 9 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 5.50 % and 6.39 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

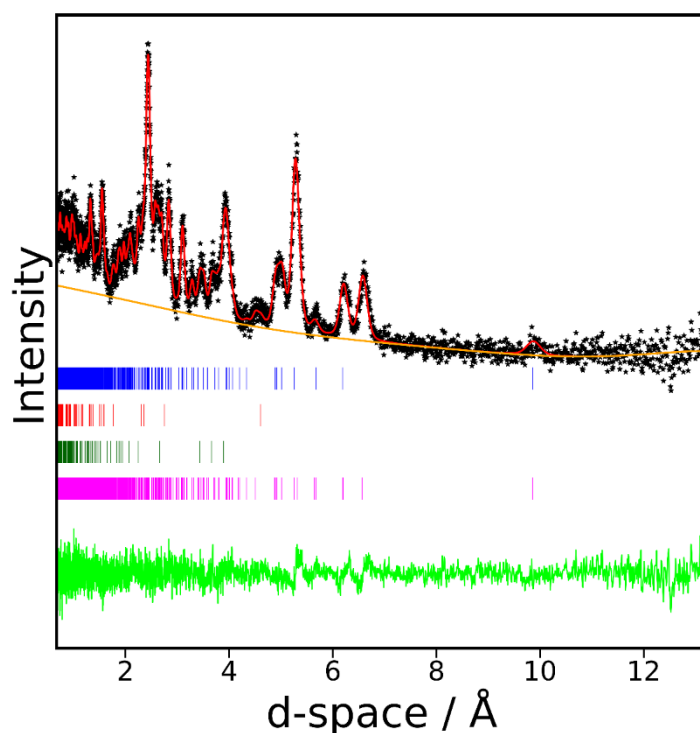**Figure S246:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 9 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 3.93 % and 4.36 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.
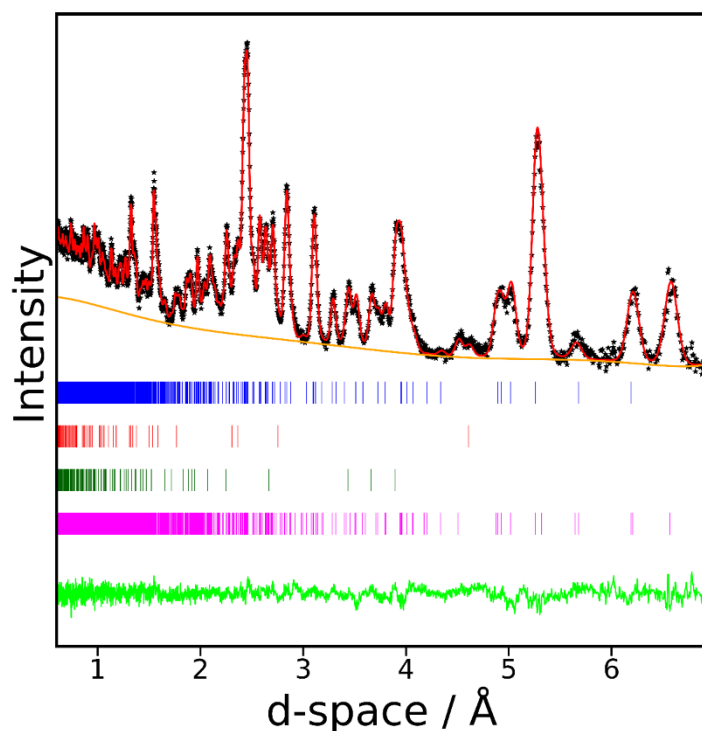
Figure S247: Neutron diffraction pattern collected from [Li(C₂O₄)]₂[Co₅(OD)₈] at 9 K using bank 3 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.67 % and 2.84 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C₂O₄)]₂[Co₅(OD)₈], Co(OD)₂ , D₂O and the magnetic phases, respectively.
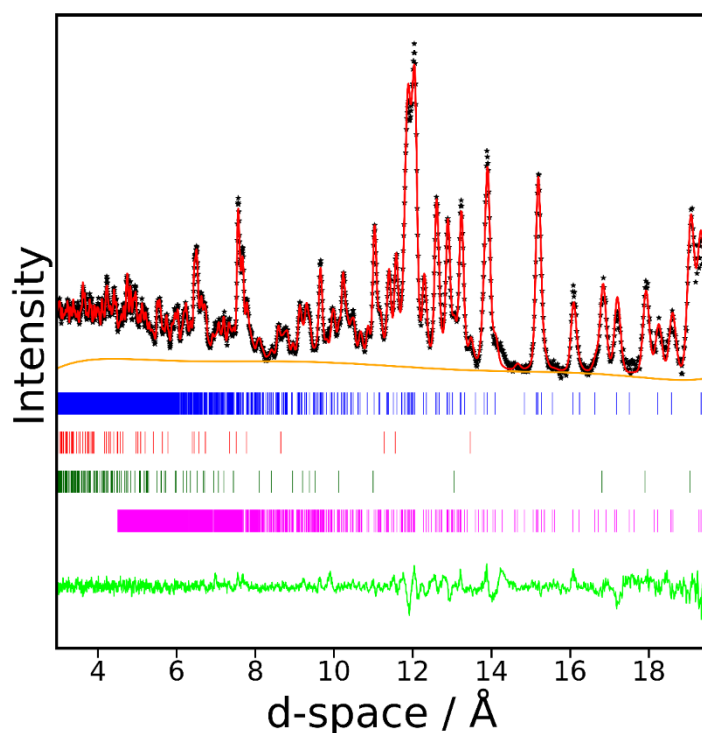
Figure S248: Neutron diffraction pattern collected from [Li(C₂O₄)]₂[Co₅(OD)₈] at 9 K using bank 4 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.87 % and 2.95 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the [Li(C₂O₄)]₂[Co₅(OD)₈], Co(OD)₂ , D₂O and the magnetic phases, respectively.

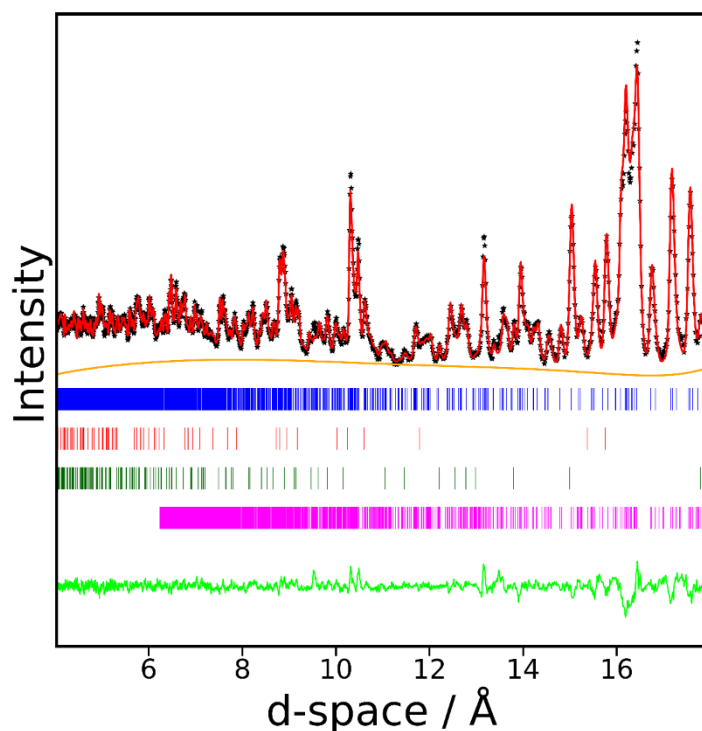**Figure S249:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 9 K using bank 5 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.88 % and 3.09 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

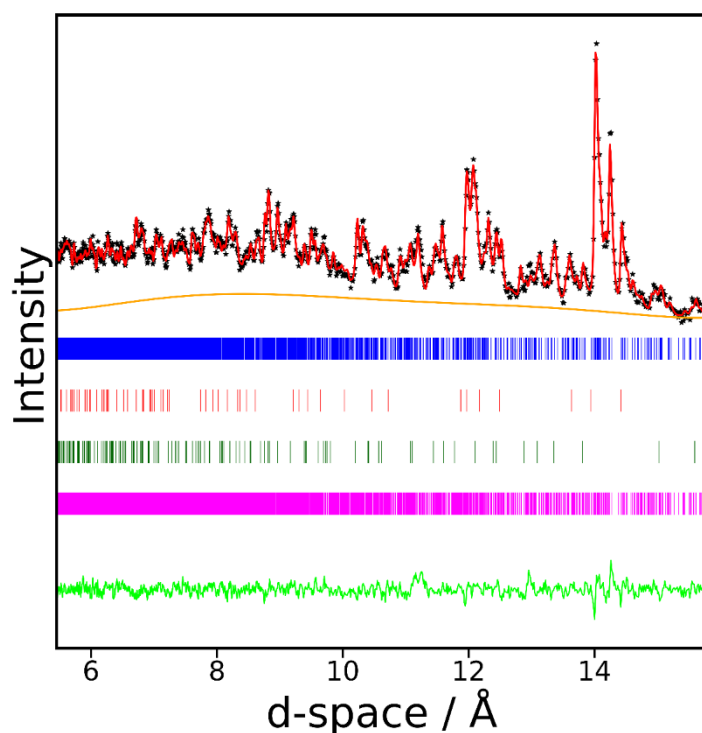**Figure S250:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 9 K using bank 6 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 1.92 % and 2.29 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

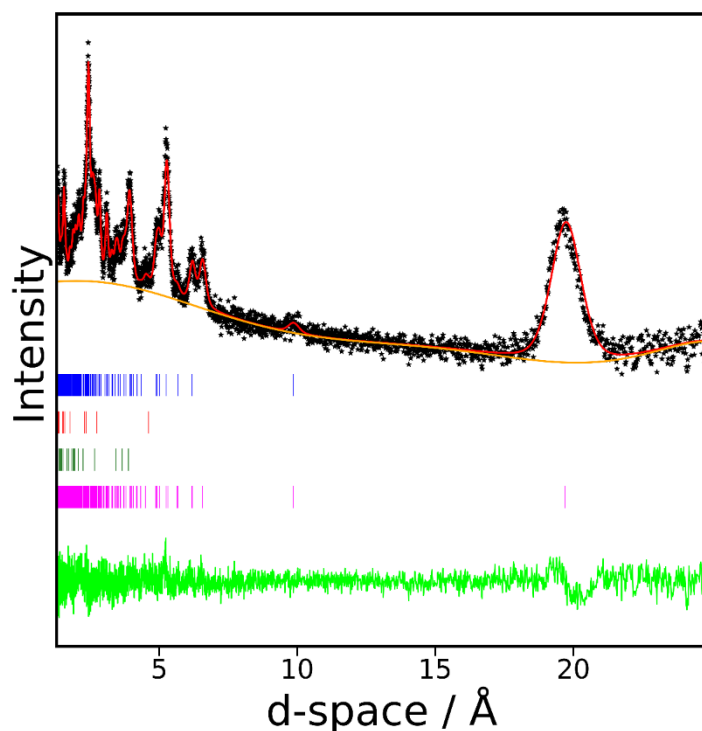**Figure S251:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 8 K using bank 1 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.94 % and 3.32 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.

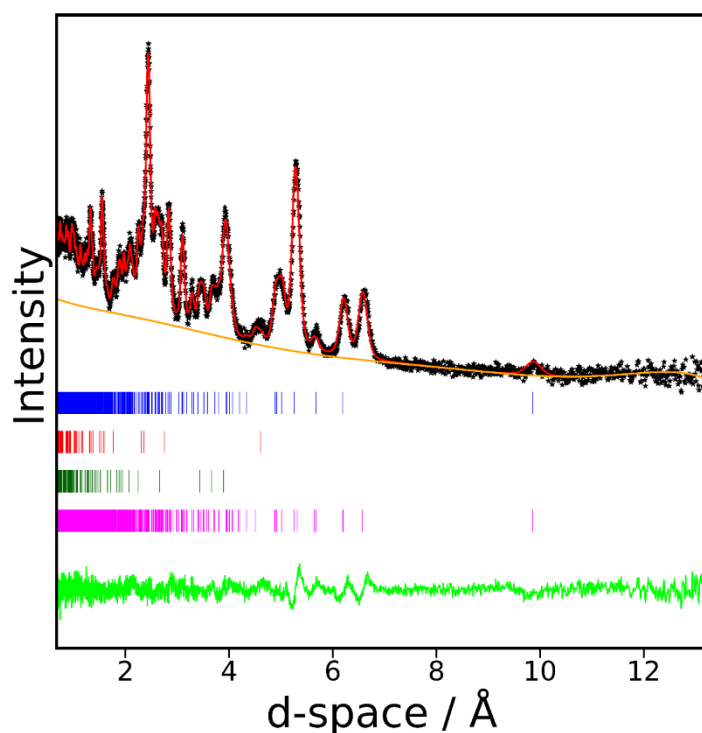**Figure S252:** Neutron diffraction pattern collected from $[Li(C_2O_4)]_2[Co_5(OD)_8]$ at 8 K using bank 2 of the GEM diffractometer fitted using the Rietveld method with R_p and R_{wp} of 2.24 % and 2.59 %, respectively. The crosses and the red, orange, and green lines indicate the observed and calculated intensities, the estimated background and difference curve, respectively. Blue, red, green and magenta markers represent reflections allowed by the $[Li(C_2O_4)]_2[Co_5(OD)_8]$, $Co(OD)_2$, D_2O and the magnetic phases, respectively.