



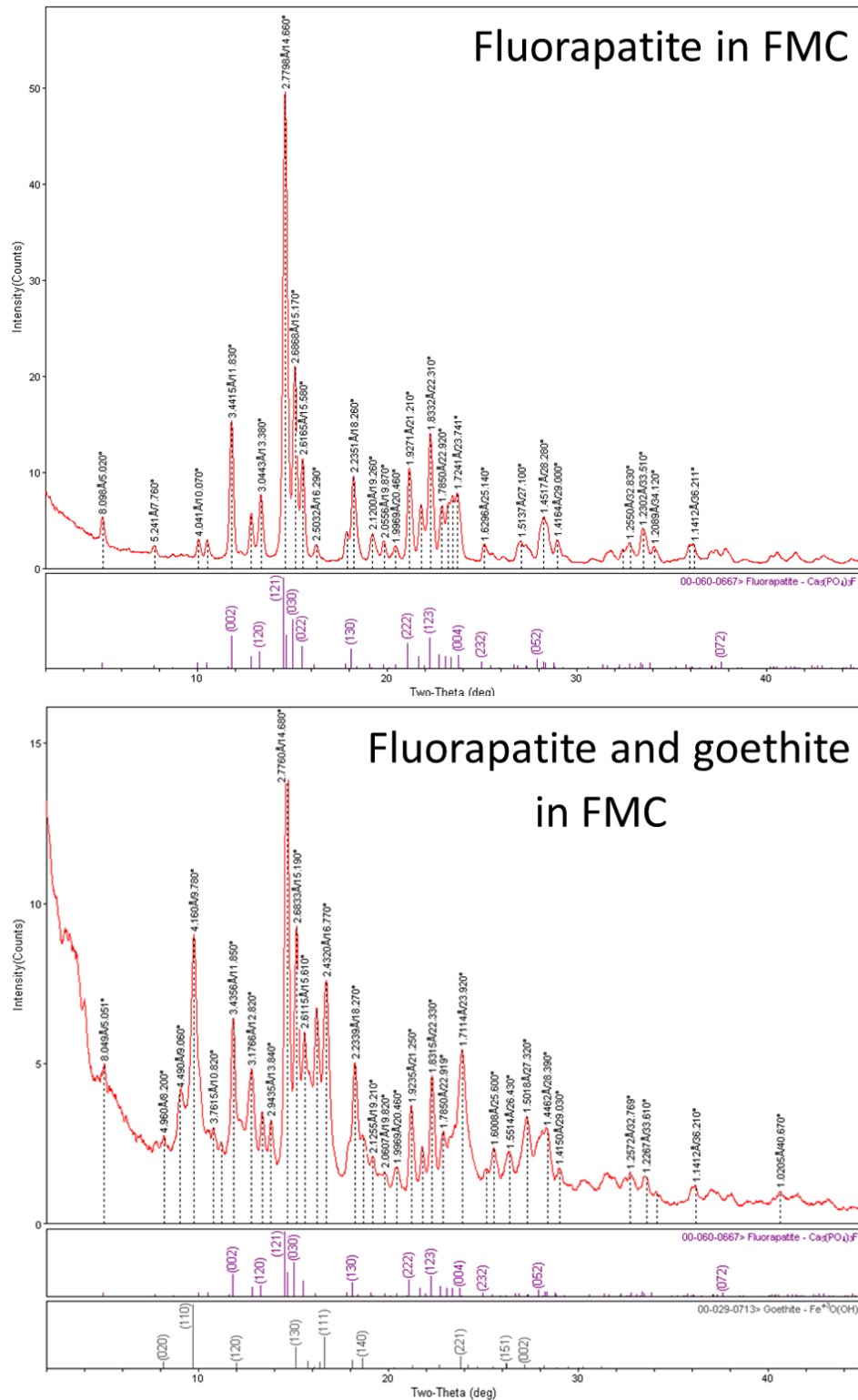
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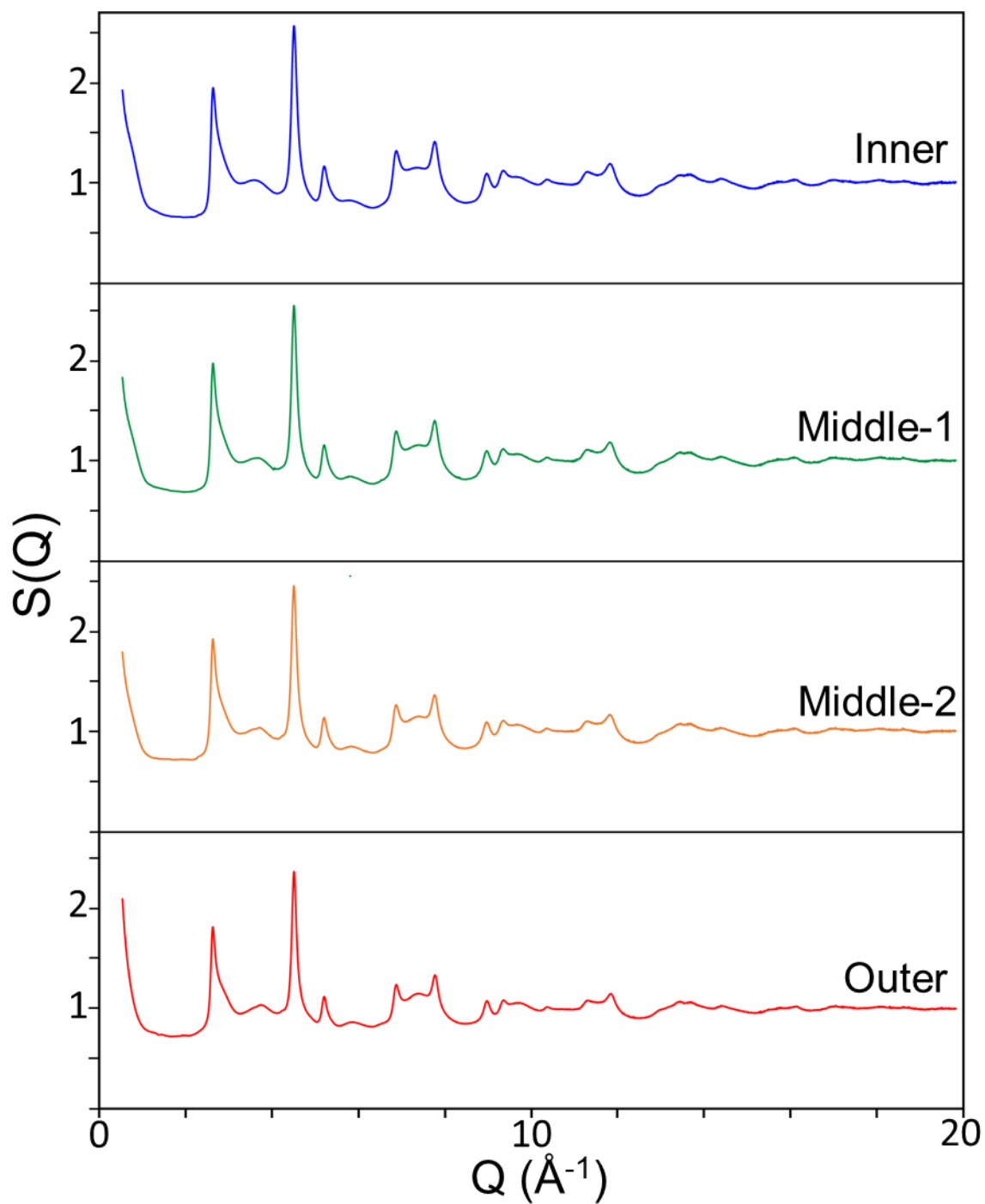
**Supporting information for article:**

**The structure and crystal chemistry of vernadite in ferromanganese  
crusts**

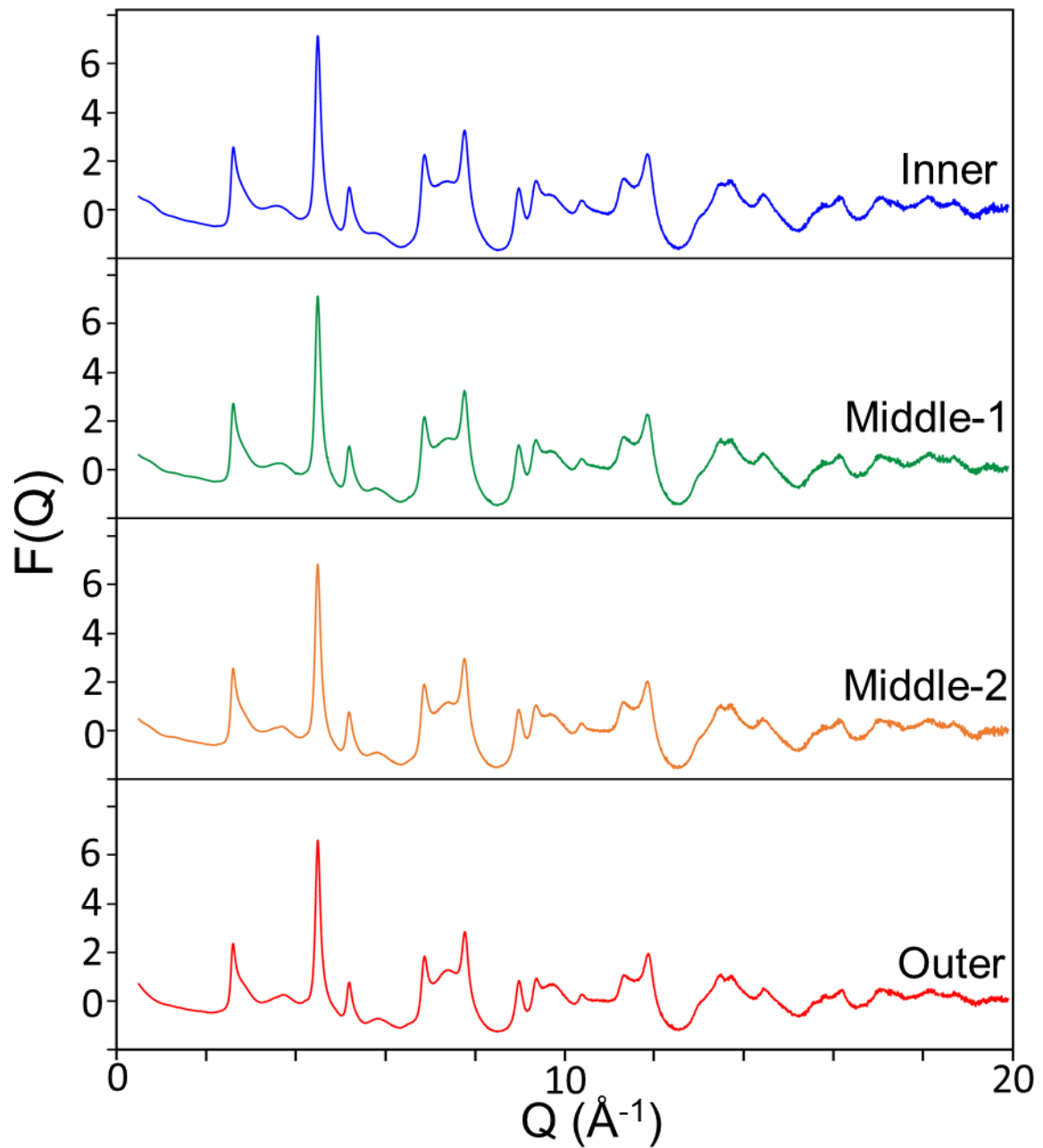
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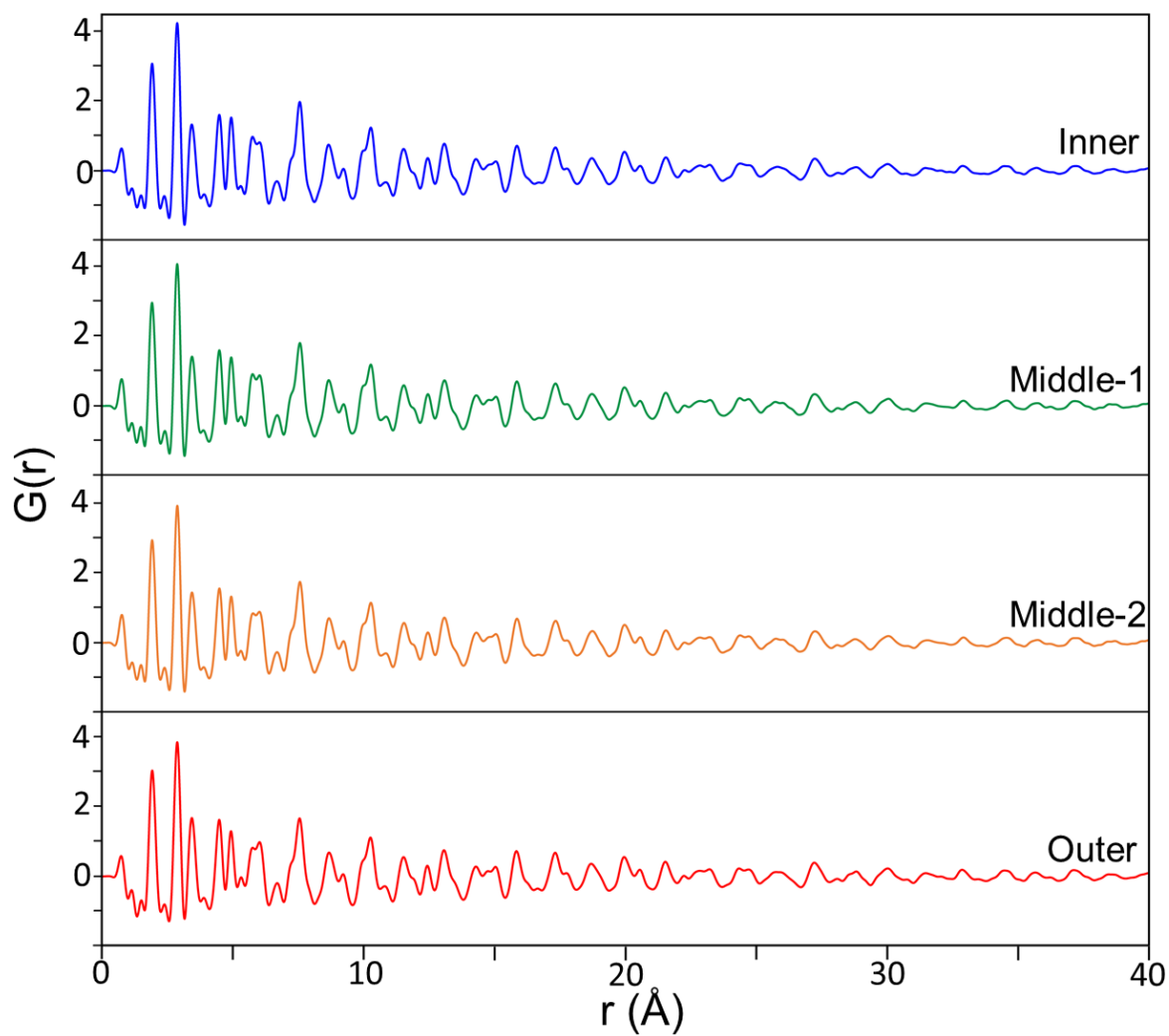
**Figure S1** The XRD pattern of fluorapatite and goethite phases in ferromanganese crust from Magellan seamount in the north-west Pacific Ocean



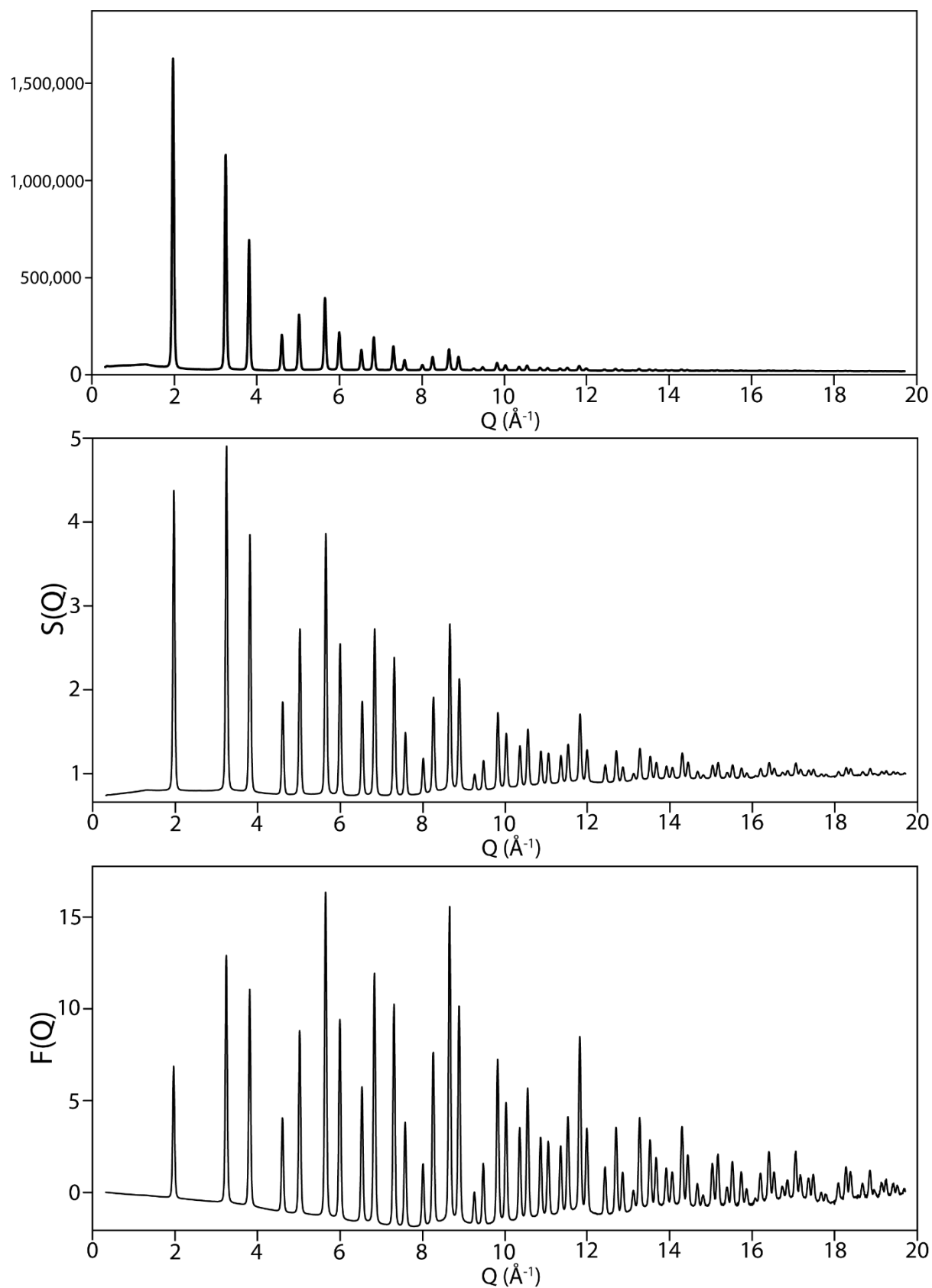
**Figure S2** The structure factor,  $S(Q)$ , of vernadite phases in ferromanganese crust. The wavelength is 0.24116  $\text{\AA}$ .



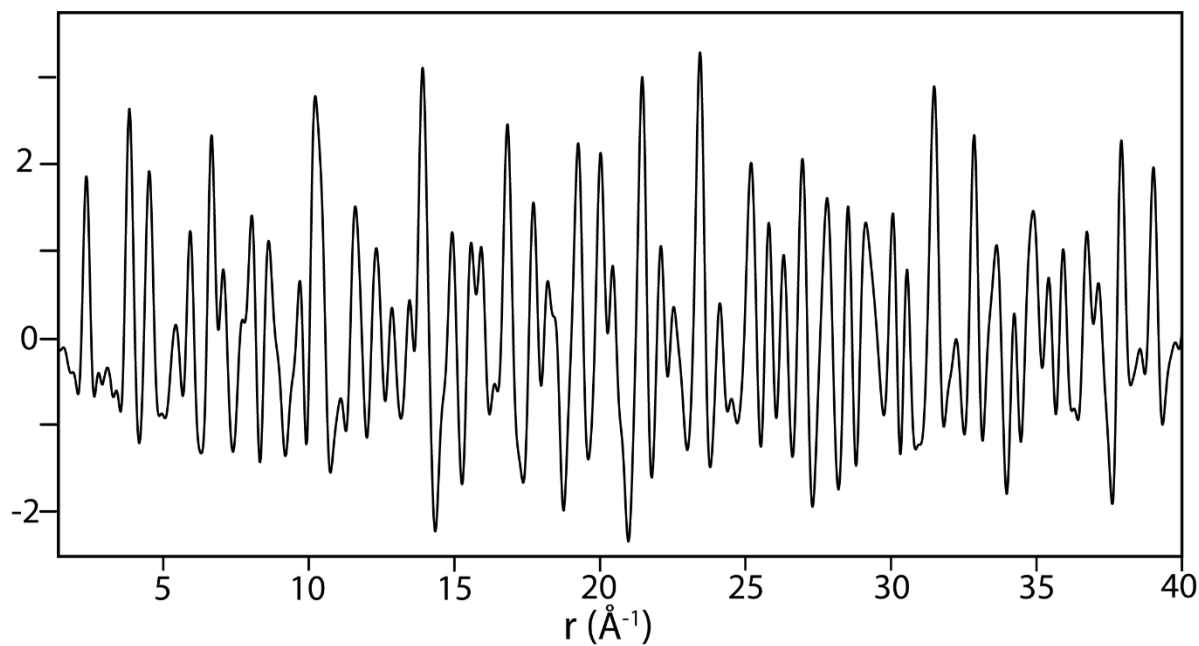
**Figure S3** The reduced structure factor,  $F(Q)$ , of vernadite phases in ferromanganese crust.



**Figure S4** Experimental PDF patterns of vernadite phases from the outer part to the inner part.



**Figure S5** The XRD pattern (top), structure factor,  $S(Q)$  (middle), and reduced structure factor,  $F(Q)$  (bottom) of Si standard.



**Figure S6** PDF pattern of Si standard.

**Table S1** Atom parameters of 7-Å vernadite phases (outer part) from PDF refinement (see Fig. 6 for detail).

Inner	x	y	z	$U_{11,22}$	$U_{33}$	Occ
Mn	0	0	0	0.004(4)	0.013(4)	0.90(2)
O	0.362(4)	0	0.133(6)	0.005(5)	0.025(8)	1.00
MnIL	0.672(5)	0	0.316(5)	0.015(2)		0.09(2)
OIL	0	0	0.5	0.021(3)		0.15(4)
NaIL	0.597(5)	0	0.5	0.019(3)		0.04
KIL	0.597(5)	0	0.5	0.019(3)		0.04