

Supplementary information

Bond Type	Bond length	MSRD	Coord. No.
Air			
Ca-O	2.346±0.005	0.007±0.001	4
Ca-O	2.55±0.02	0.014±0.004	2
Ca-O	2.72±0.02	0.014±0.004	2
Ca-Si	3.083±0.006	0.003±0.001	2
Ca-Mg	3.38±0.02	0.015±0.003	4
Ar-H ₂			
Ca-O	2.331±0.005	0.006±0.001	3.5±0.2
Ca-O	2.49±0.02	0.015±0.004	2.0±0.4
Ca-O	2.65±0.02	0.015±0.004	2.0±0.4
Ca-Si	3.084±0.005	0.003±0.001	2
Ca-Mg	3.37±0.02	0.015±0.002	4
Ar-H ₂ +			
Ca-O	2.332±0.004	0.007±0.001	2.9±0.1
Ca-O	2.49±0.02	0.018±0.003	2.0±0.4
Ca-O	2.65±0.02	0.018±0.003	2.0±0.4
Ca-Si	3.096±0.005	0.006±0.001	2
Ca-Mg	3.32±0.01	0.025±0.003	4

Table S1. Values of bond length, coordination number and mean square radial displacement (MSRD) in diopsides annealed under different atmospheres at 1100°C obtained from Ca K edge EXAFS fitting. The numbers in parentheses are uncertainties in the last digit.

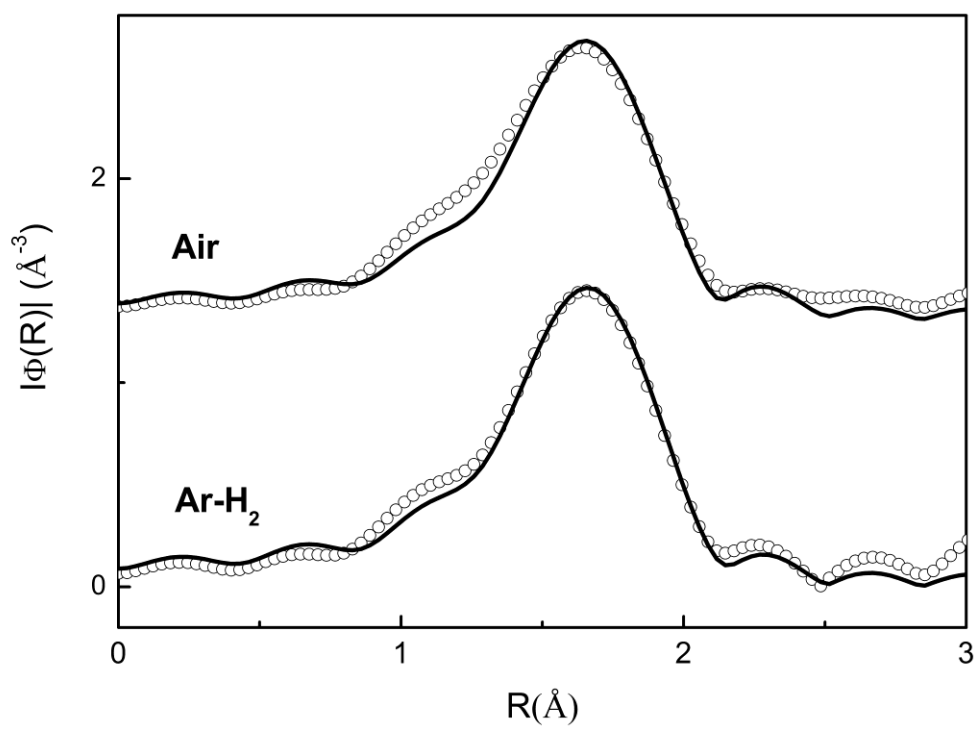


Figure S2. Magnitude of Fourier transforms of k^3 weighted EXAFS of Mn K-edge