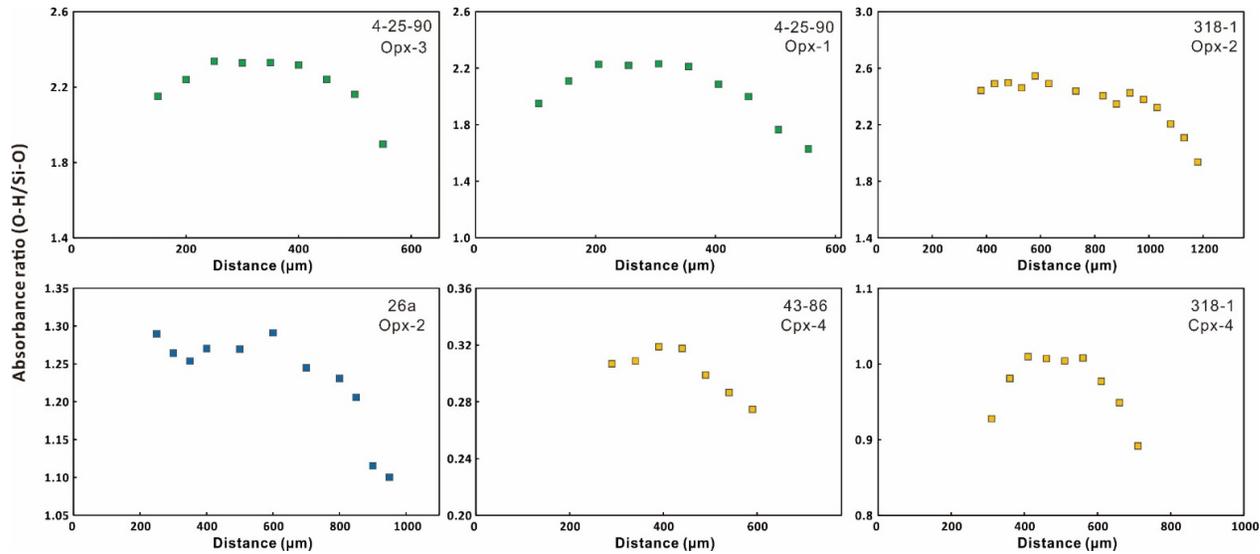


## Supplementary Information (SI)

Figure S1



**Figure S1.** Ratio profiles of integrated absorbance ( $E//\gamma$ ) between O-H bands and Si-O bands. The Si-O bands of orthopyroxene and clinopyroxene occur at 1820–1700  $\text{cm}^{-1}$  and 1750–1450  $\text{cm}^{-1}$ , respectively. Sample 4-25-90 is a Type-1 xenolith, samples 318-1 and 43-86 are Type-2 xenoliths, and sample 26a is assigned as other xenolith. The ratio profiles suggest that the hydrogen variations across the grains are not artefacts caused by sample preparation.

Figure S2 (a)

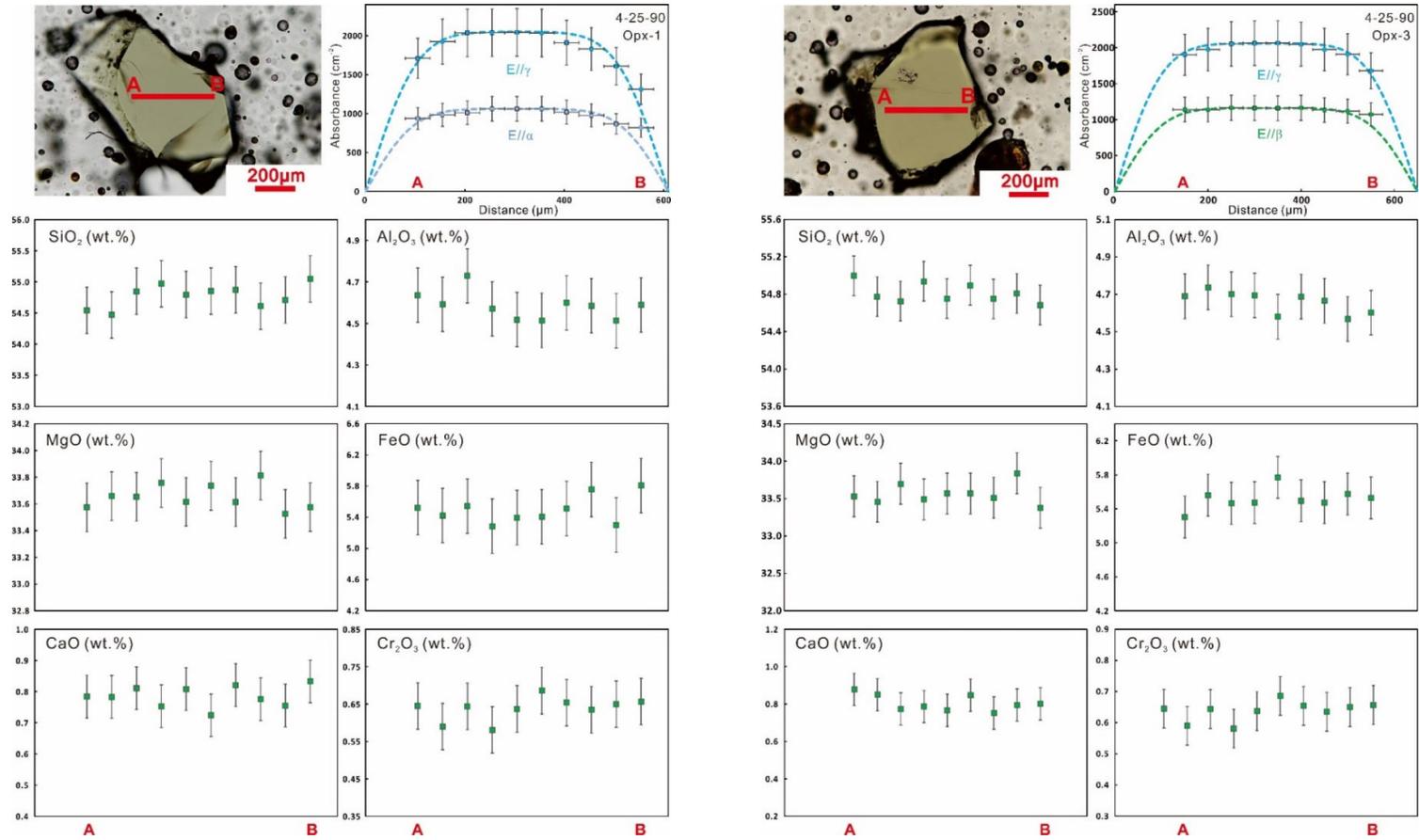


Figure S2 (b)

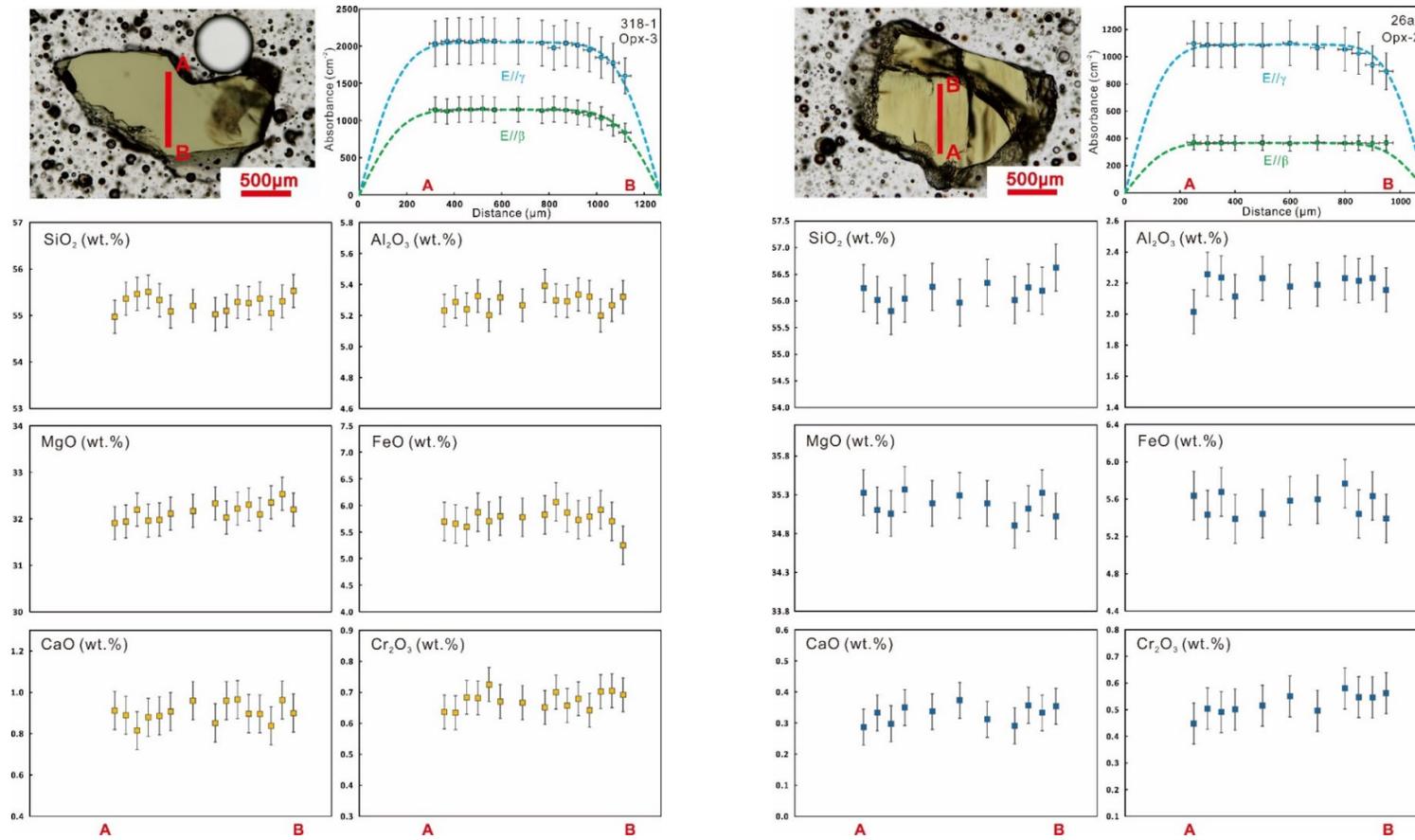


Figure S2 (c)

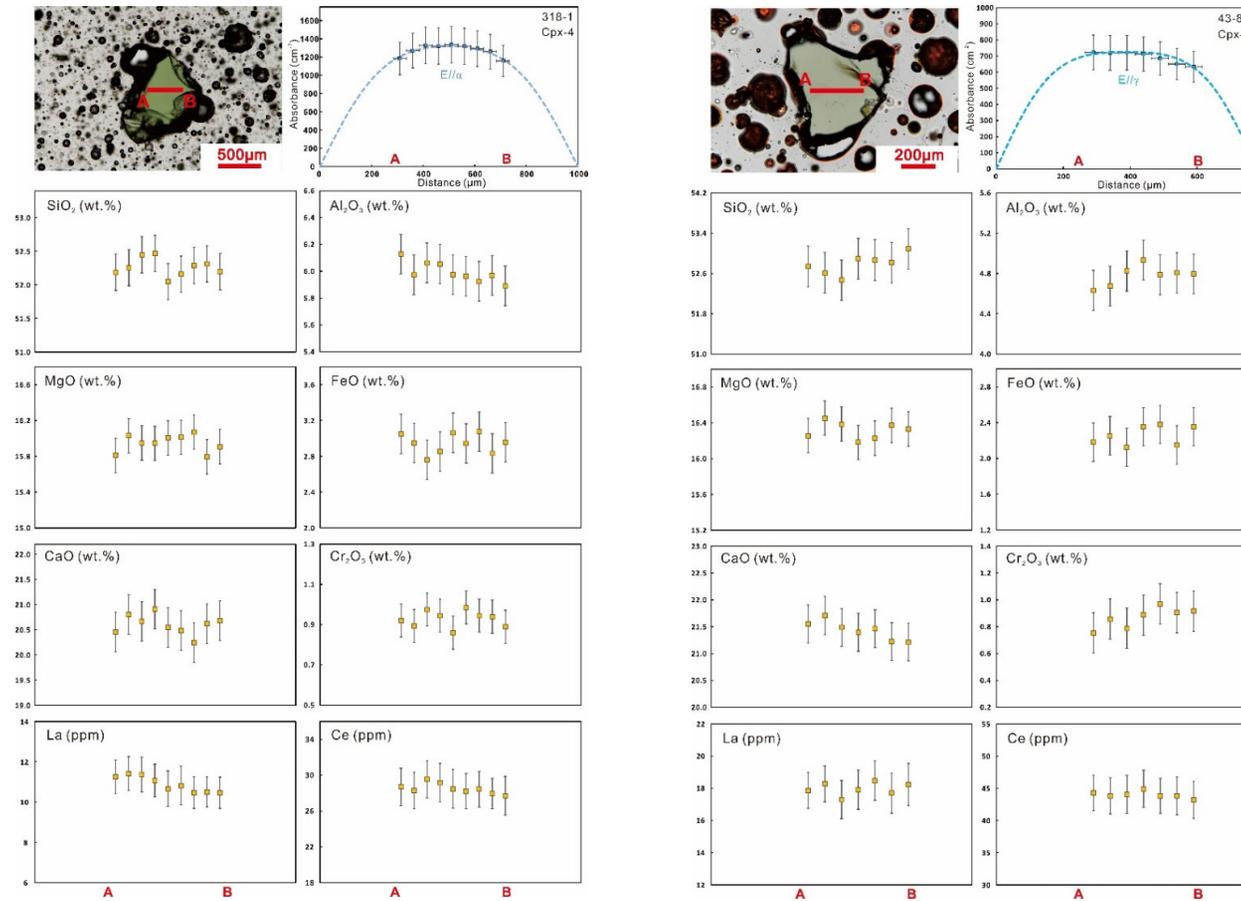


Figure S2. Major and trace element concentration profiles in pyroxenes. The error bars are 2σ standard deviation.