

**Table S1. Conditions of electron microprobe analysis of major and minor elements.**

Element	X-ray line	XTAL <sup>a</sup>	Standard	Peak cnt. time [s]	Det. lim. [ppm]	Overlap corrections
Ca	K $\alpha$	LPET	diopside	20	160	
La	L $\alpha$	LPET	LaPO <sub>4</sub>	20	480	Nd L $\beta$
Ce	L $\alpha$	LPET	CePO <sub>4</sub>	20	490	
Na	K $\alpha$	TAP	albite	20	520	
P	K $\alpha$	TAP	CePO <sub>4</sub>	10	380	Y L $\beta$ <sub>2</sub>
Si	K $\alpha$	TAP	SiO <sub>2</sub>	20	165	
F	K $\alpha$	LTAP	apatite	10	840	Ce M $\zeta$ <sub>1</sub>
Mg	K $\alpha$	LTAP	diopside	20	170	
Y	L $\alpha$	TAP	YPO <sub>4</sub>	50	350	
Al	K $\alpha$	TAP	orthoclase	30	180	
K	K $\alpha$	LPET	orthoclase	20	160	
Ti	K $\alpha$	LPET	TiO <sub>2</sub>	20	190	
Fe	K $\alpha$	LLIF	hematite-SPI25	20	430	
Th	M $\alpha$	LPET	ThO <sub>2</sub>	40	475	
Pr	L $\alpha$	LPET	PrPO <sub>4</sub>	20	140	La L $\beta$ <sub>1</sub>
Sm	L $\alpha$	LLIF	SmPO <sub>4</sub>	30	660	Ce L $\beta$ <sub>2</sub>
Nd	L $\alpha$	LPET	NdPO <sub>4</sub>	60	290	Ce L $\beta$ <sub>1</sub>
Mn	K $\alpha$	LLIF	rhodonite	30	380	

<sup>a</sup> The full names of the diffracting crystals (from the Table S1 and the section 3.1.) are as follows: LPET – Large Pentaerythritol; PETJ – Pentaerythritol J-type (JEOL); PETH – Pentaerythritol H-type (higher X-ray intensity); TAP – Thallium acid Phthalate; LTAP – Large TAP; LIF – Lithium Fluoride; LLIF – Large LIF; LIFH – LIF H-type.