

Electronic Supplementary Material for

Comparison of calcined illitic clays (brick clays) and low-grade kaolinitic clays as supplementary cementitious materials

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Figs. S1 to S13

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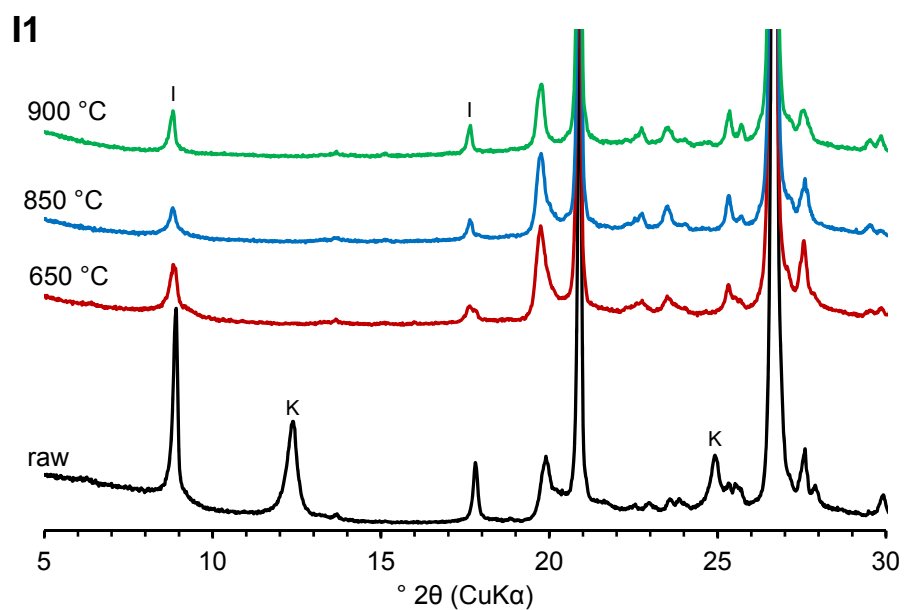


Fig. S1 XRD patterns of clay I1 before and after calcination at the indicated temperatures (I–illite/dehydroxylated illite; K–kaolinite)

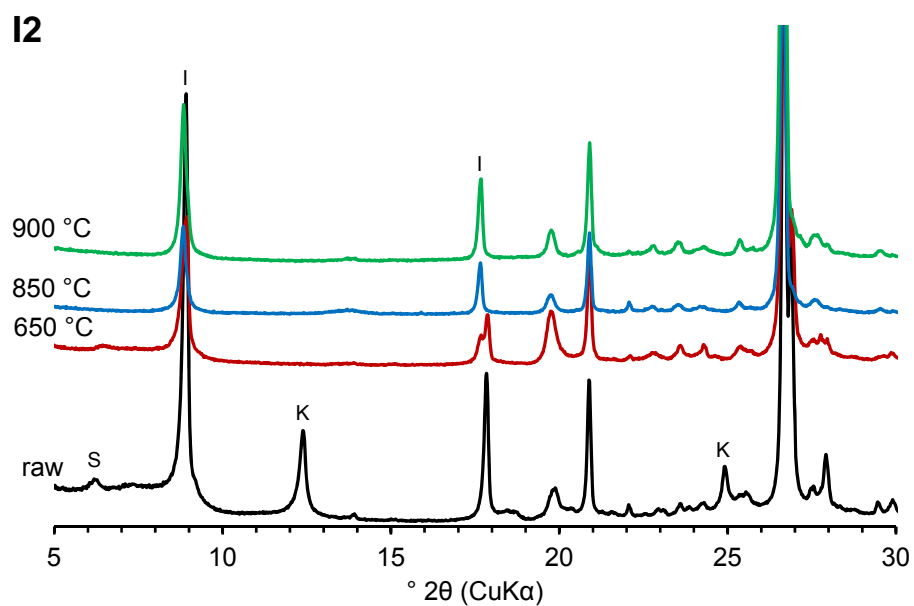


Fig. S2 XRD patterns of clay I2 before and after calcination at the indicated temperatures (S–smectite; I–illite/dehydroxylated illite; K–kaolinite)

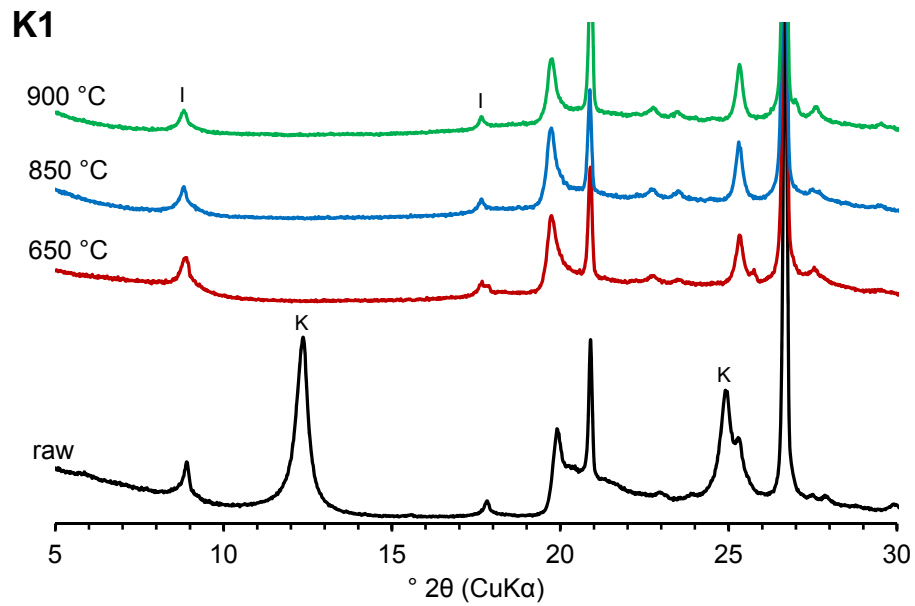


Fig. S3 XRD patterns of clay K1 before and after calcination at the indicated temperatures (I–illite/dehydroxylated illite; K–kaolinite)

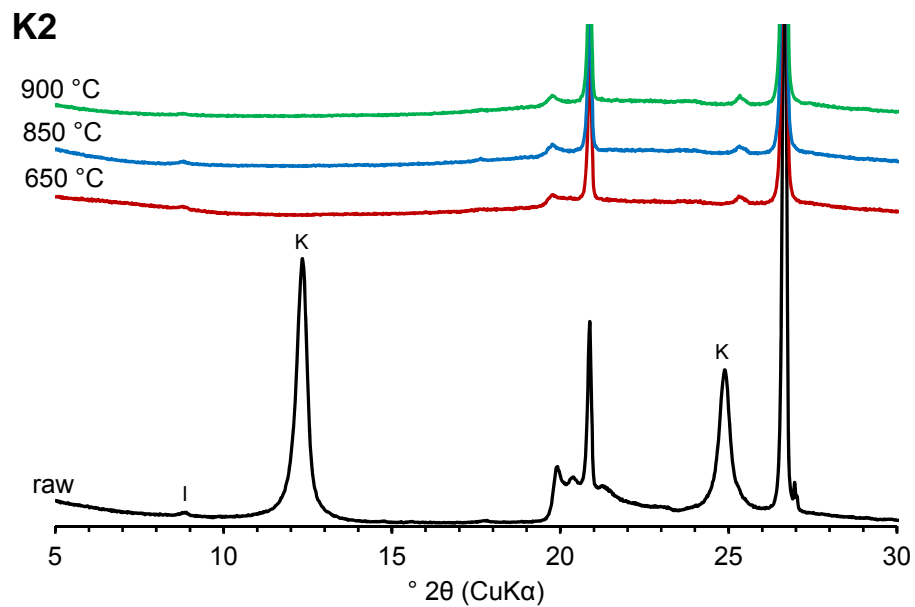


Fig. S4 XRD patterns of clay K2 before and after calcination at the indicated temperatures (I–illite/dehydroxylated illite; K–kaolinite)

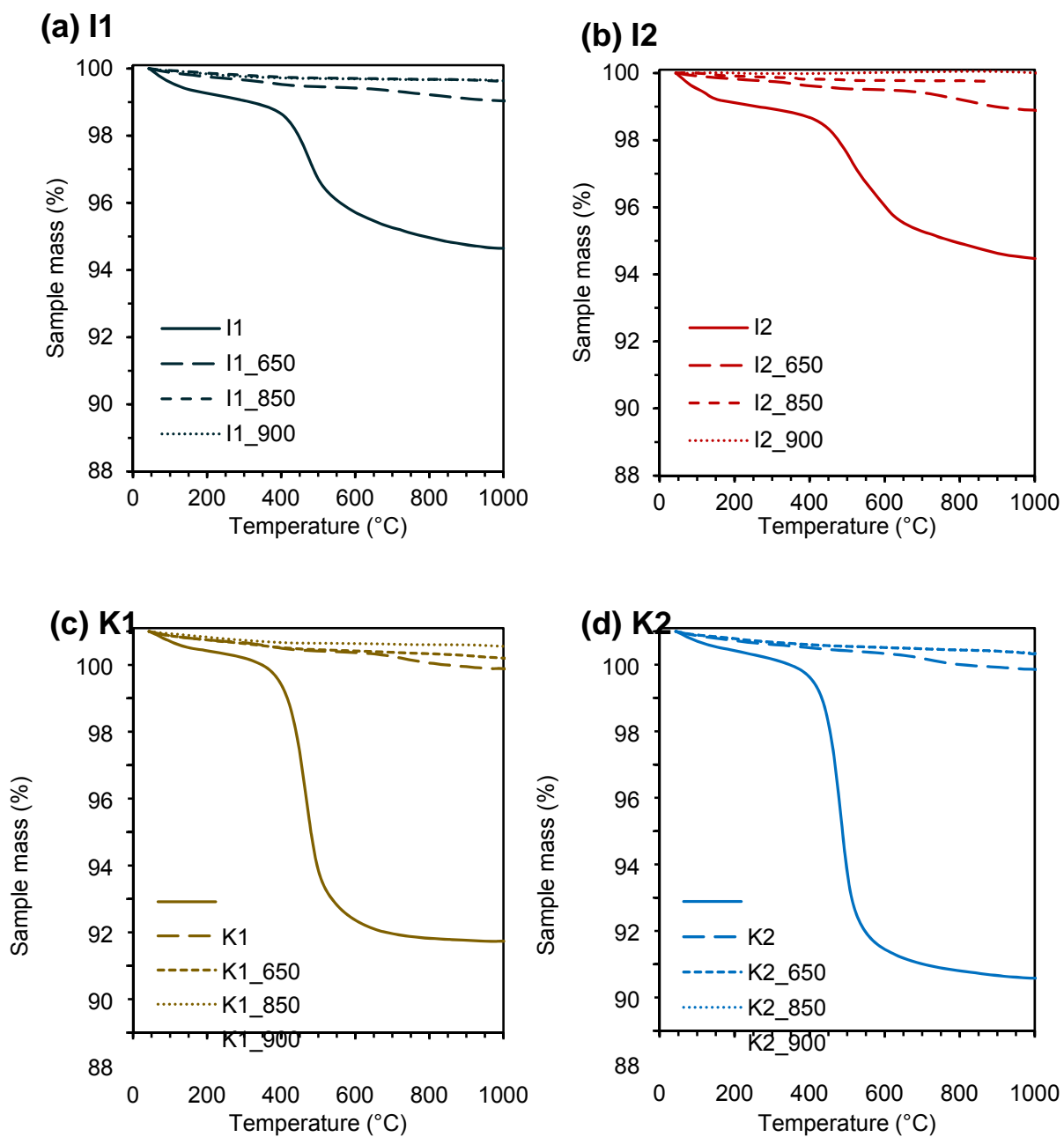


Fig. S5 TGA curves of the clays before and after calcination at the indicated temperatures; **(a)** I1, **(b)** I2, **(c)** K1, **(d)** K2

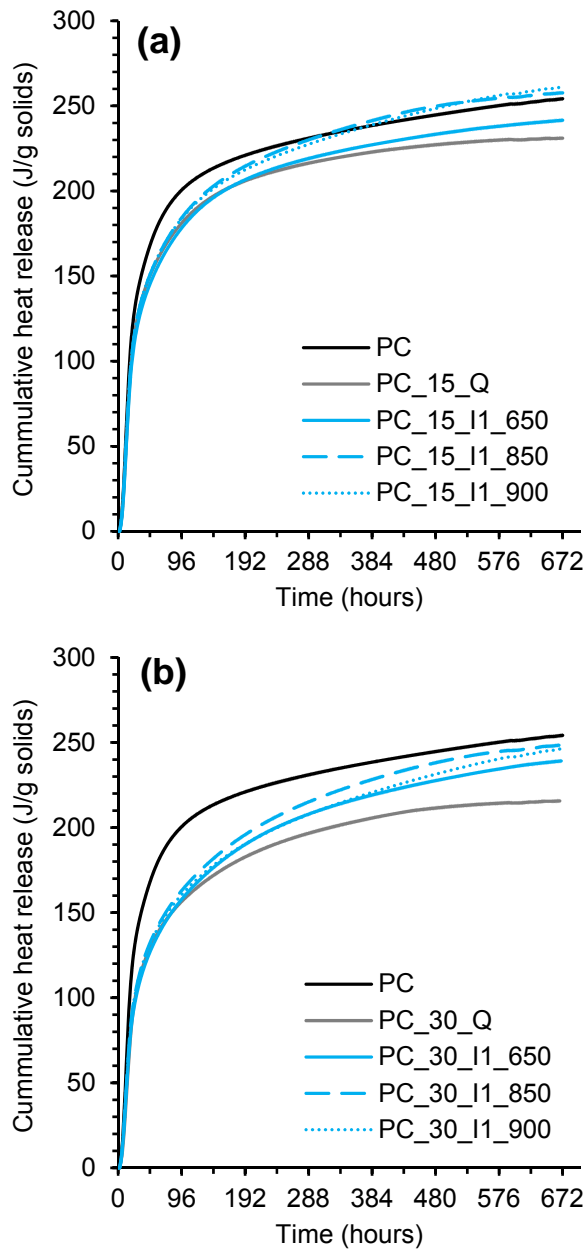


Fig. S6 Cumulative heat release normalised per gram of solids of the plain Portland cement paste and the blended cement pastes with **(a)** 15 v/v% cement replacement with calcined clay I1 or quartz powder and **(b)** 30 v/v% cement replacement with calcined clay I1 or quartz powder

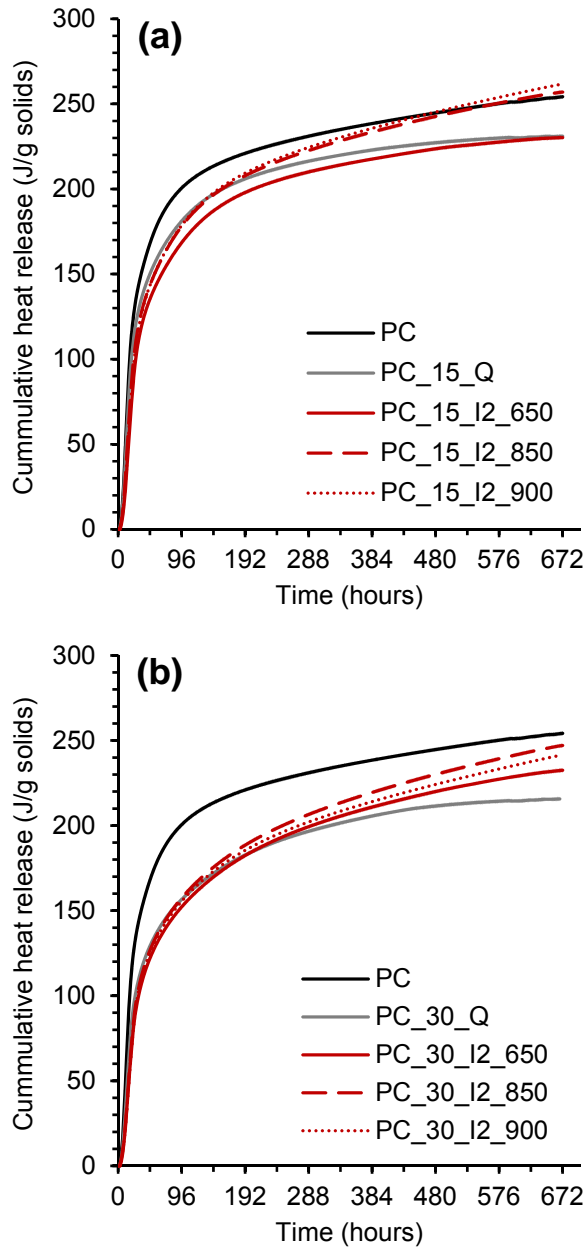


Fig. S7 Cumulative heat release normalised per gram of solids of the plain Portland cement paste and the blended cement pastes with **(a)** 15 v/v% cement replacement with calcined clay I2 or quartz powder and **(b)** 30 v/v% cement replacement with calcined clay I2 or quartz powder

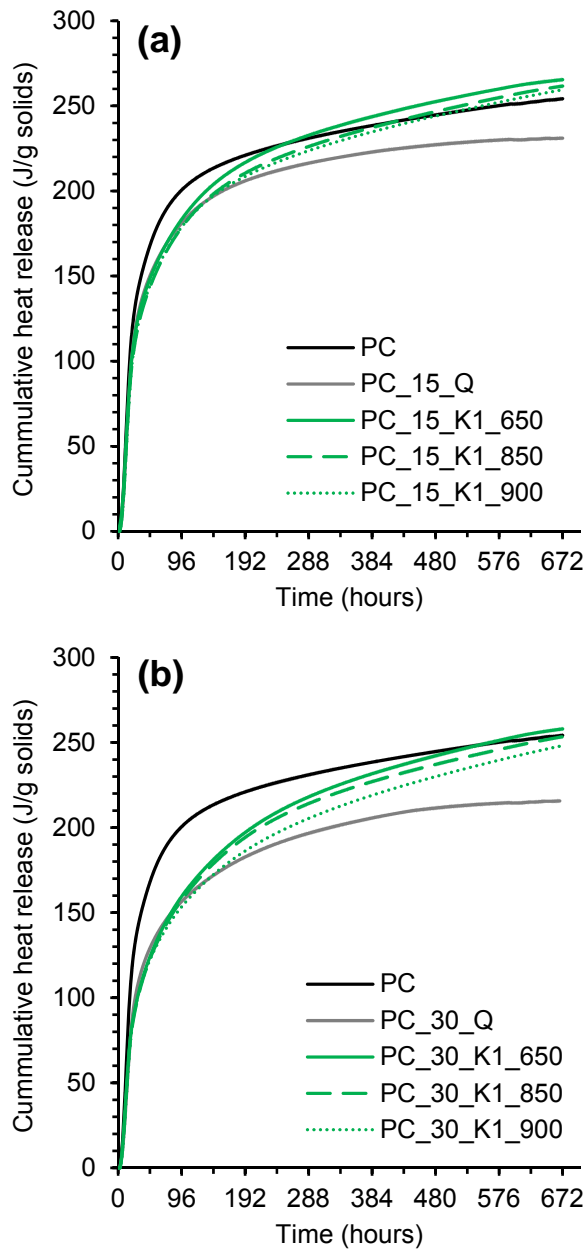


Fig. S8 Cumulative heat release normalised per gram of solids of the plain Portland cement paste and the blended cement pastes with **(a)** 15 v/v% cement replacement with calcined clay K1 or quartz powder and **(b)** 30 v/v% cement replacement with calcined clay K1 or quartz powder

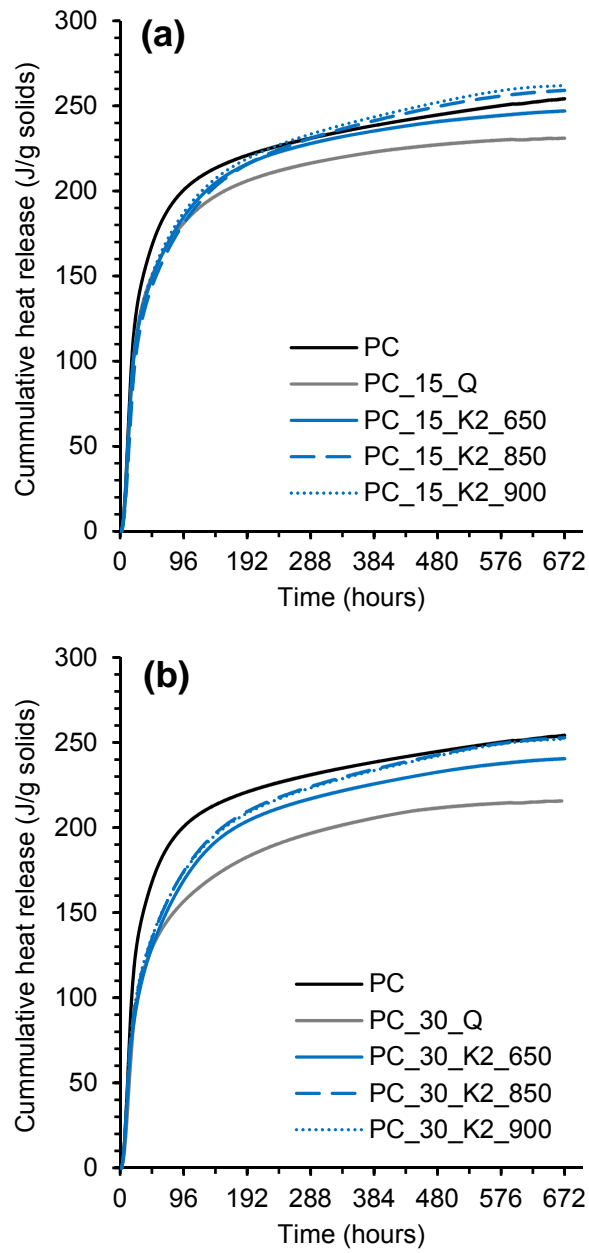


Fig. S9 Cumulative heat release normalised per gram of solids of the plain Portland cement paste and the blended cement pastes with **(a)** 15 v/v% cement replacement with calcined clay K2 or quartz powder and **(b)** 30 v/v% cement replacement with calcined clay K2 or quartz powder

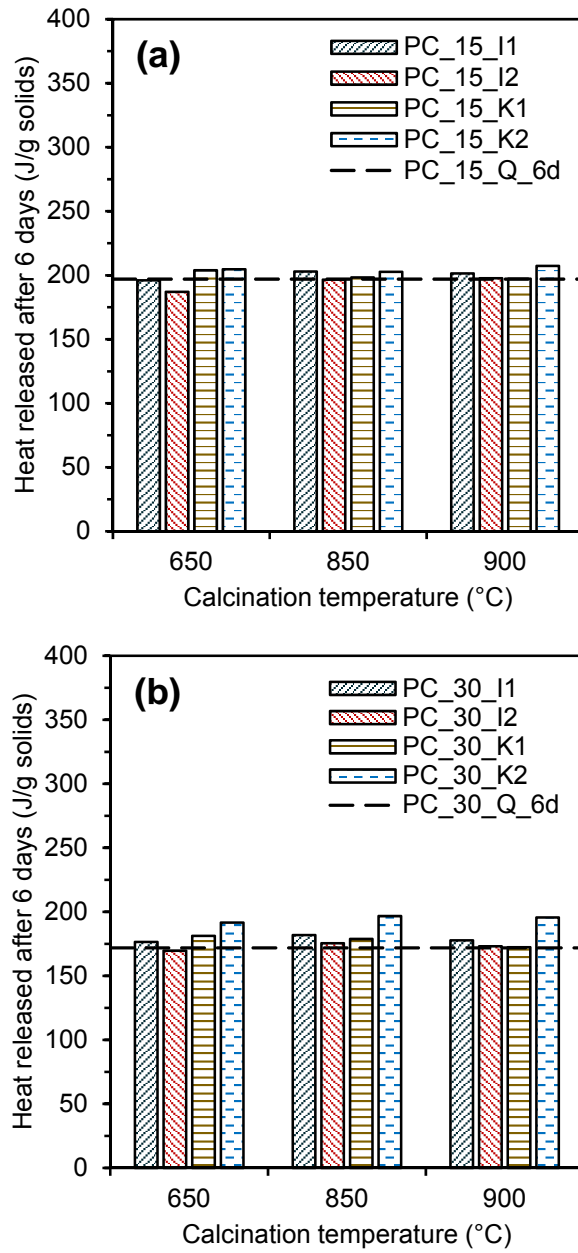


Fig. S10 Cumulative heat release of the blended cement pastes with **(a)** 15 v/v% and **(b)** 30 v/v% cement replacement after six days of hydration

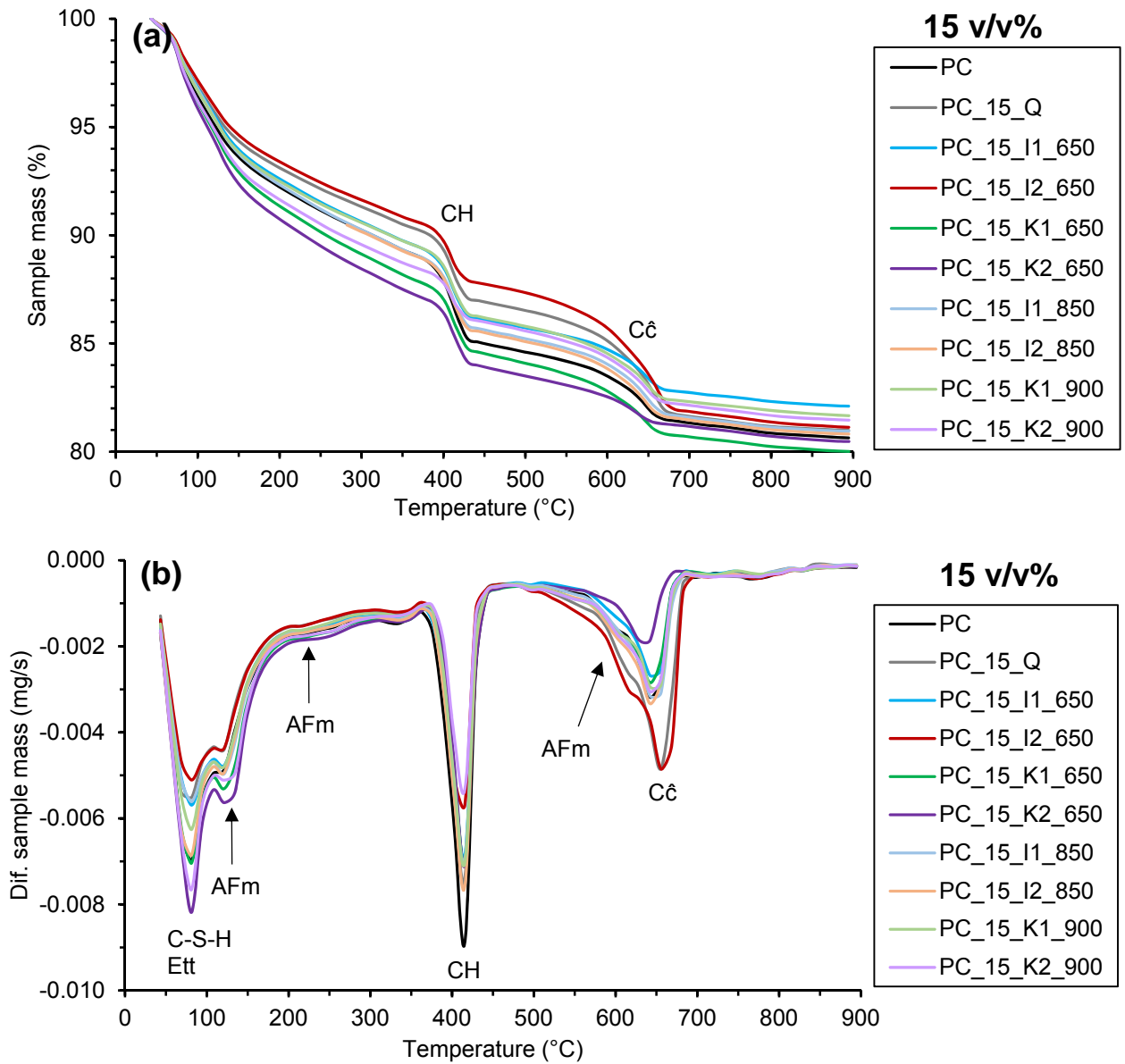


Fig. S11 (a) TGA curves and (b) DTG curves of the plain Portland cement paste and the blended cement pastes with 15 v/v% cement replacement after 28 days of hydration (C-S-H–calcium silicate hydrate; Ett–ettringite; AFm–hemihydrate/monohydrate; CH–portlandite; Cê–calcite)

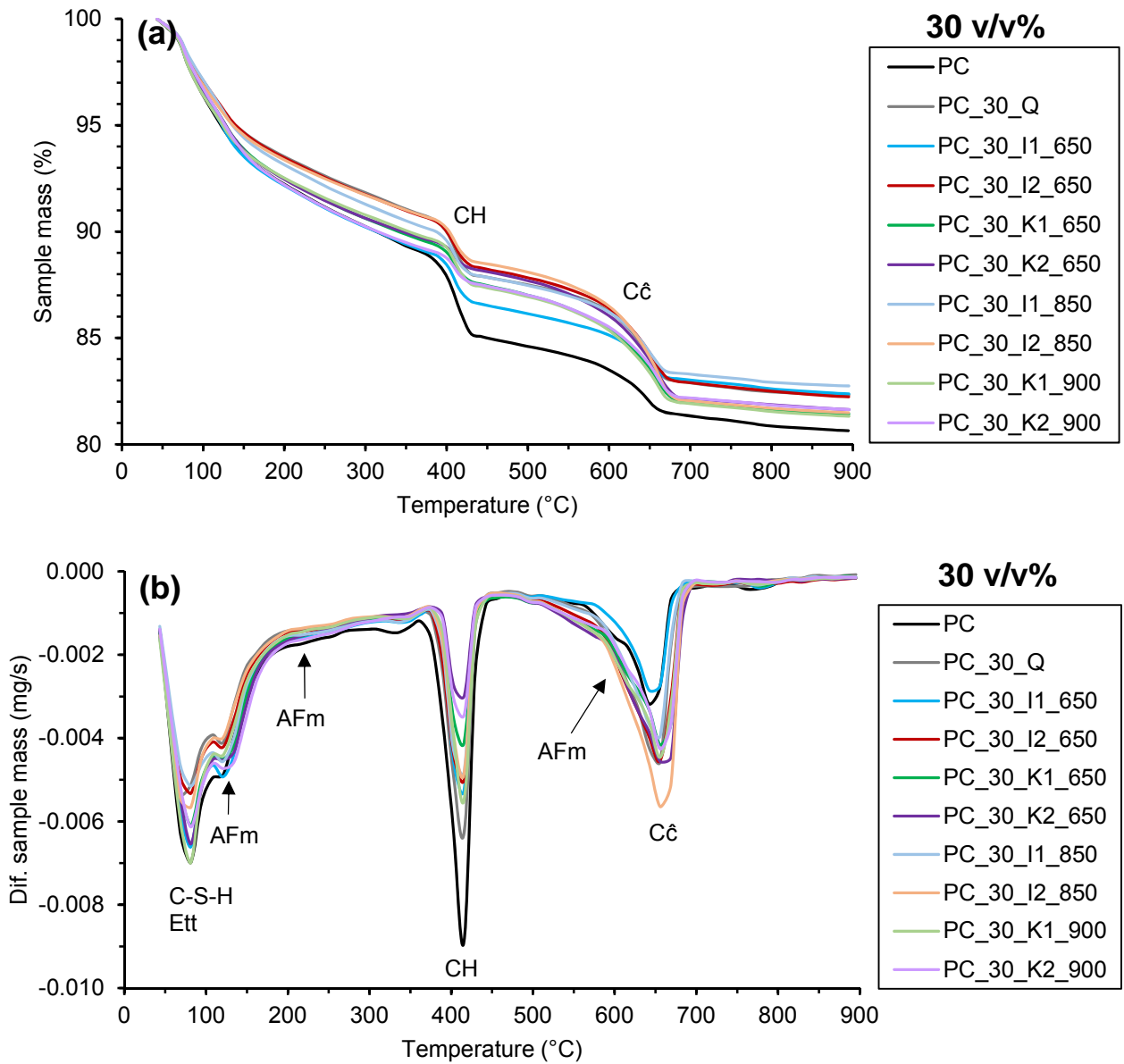


Fig. S12 (a) TGA curves and (b) DTG curves of the plain Portland cement paste and the blended cement pastes with 30 v/v% cement replacement after 28 days of hydration (C-S-H–calcium silicate hydrate; Ett–ettringite; AFm–hemihydrate/monohydrate; CH–portlandite; Ĉ–calcite)

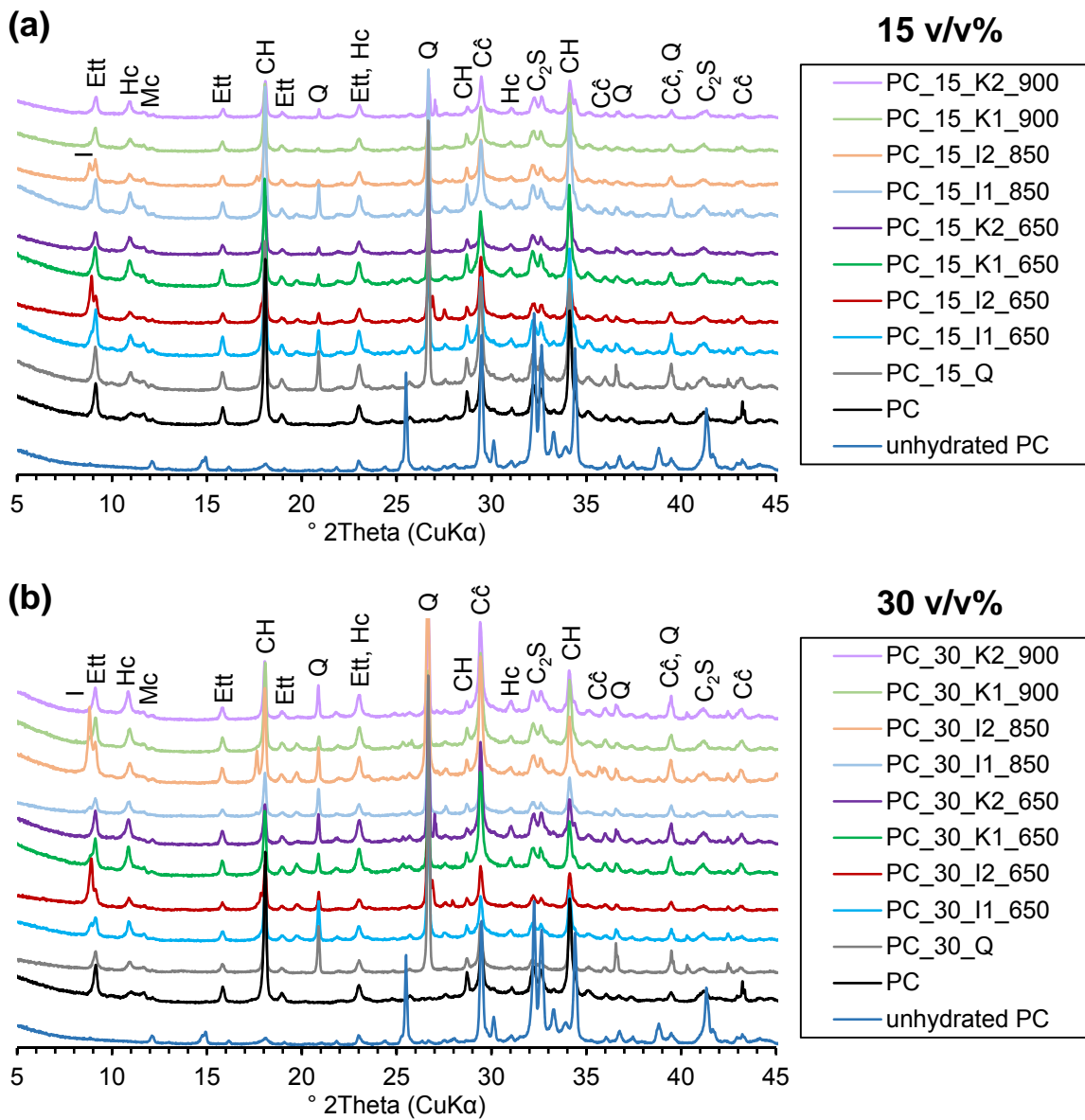


Fig. S13 XRD patterns of the plain Portland cement paste and the blended cement pastes with **(a)** 15 v/v% cement replacement and **(b)** 30 v/v% cement replacement after 28 days of hydration (I–illite/dehydroxylated illite; Ett–ettringite; Hc–hemihydrate; Mc–monocarbonate; CH–portlandite; Q–quartz; C \hat{c} –calcite; C₂S–belite)

Table S1 Bound water content of the plain Portland cement paste and the blended cement pastes with 15 v/v% cement replacement after 28 days of hydration

Cement paste	Bound water (50–500 °C) (%)	Ignited wt. at 900 °C (%)	Bound water rel. to ignited wt. (%)	Relative strength (%)
PC	14.43	80.64	17.89	100.00
PC_15_Q	12.25	80.99	15.13	78.93
PC_15_I1_650	12.88	82.11	15.68	84.31
PC_15_I1_850	12.90	80.95	15.94	93.56
PC_15_I2_650	11.48	81.13	14.15	83.15
PC_15_I2_850	13.00	80.82	16.09	79.13
PC_15_K1_650	14.00	80.01	17.50	87.25
PC_15_K1_900	12.80	81.67	15.68	96.27
PC_15_K2_650	14.73	80.47	18.31	99.34
PC_15_K2_900	13.32	81.46	16.36	95.97

Table S2 Bound water content of the plain Portland cement paste and the blended cement pastes with 30 v/v% cement replacement after 28 days of hydration

Cement paste	Bound water (50–500 °C) (%)	Ignited wt. at 900 °C (%)	Bound water rel. to ignited wt. (%)	Relative strength (%)
PC	14.43	80.64	17.89	100.00
PC_30_Q	11.19	82.32	13.59	56.54
PC_30_I1_650	12.38	82.37	15.02	69.89
PC_30_I1_850	11.31	82.74	13.67	70.80
PC_30_I2_650	11.20	82.23	13.62	59.49
PC_30_I2_850	10.87	81.49	13.34	67.17
PC_30_K1_650	11.53	81.42	14.16	67.60
PC_30_K1_900	11.89	81.32	14.62	79.23
PC_30_K2_650	11.25	81.63	13.78	78.22
PC_30_K2_900	11.58	81.63	14.19	86.37

Table S3 Portlandite content of the plain Portland cement paste and the blended cement pastes with 15 v/v% cement replacement after 28 days of hydration

Cement paste	Portlandite (%)	Ignited wt. at 900 °C (%)	Portlandite rel. to ignited wt. (%)	Relative strength (%)
PC	2.71	80.64	13.84	100.00
PC_15_Q	2.14	80.99	10.88	78.93
PC_15_I1_650	2.14	82.11	10.73	84.31
PC_15_I1_850	2.13	80.95	10.84	93.56
PC_15_I2_650	1.88	81.13	9.51	83.15
PC_15_I2_850	2.43	80.82	12.36	79.13
PC_15_K1_650	2.07	80.01	10.65	87.25
PC_15_K1_900	2.00	81.67	10.07	96.27
PC_15_K2_650	2.00	80.47	10.22	99.34
PC_15_K2_900	1.40	81.46	7.08	95.97

Table S4 Portlandite content of the plain Portland cement paste and the blended cement pastes with 30 v/v% cement replacement after 28 days of hydration

Cement paste	Portlandite (%)	Ignited wt. at 900 °C (%)	Portlandite rel. to ignited wt. (%)	Relative strength (%)
PC	2.71	80.64	13.84	100.00
PC_30_Q	1.94	82.32	9.68	56.54
PC_30_I1_650	1.50	82.37	7.49	69.89
PC_30_I1_850	1.38	82.74	6.83	70.80
PC_30_I2_650	1.47	82.23	7.34	59.49
PC_30_I2_850	1.27	81.49	6.39	67.17
PC_30_K1_650	1.13	81.42	5.72	67.60
PC_30_K1_900	1.43	81.32	7.23	79.23
PC_30_K2_650	0.73	81.63	3.69	78.22
PC_30_K2_900	0.88	81.63	4.41	86.37