

28th of June, 2022

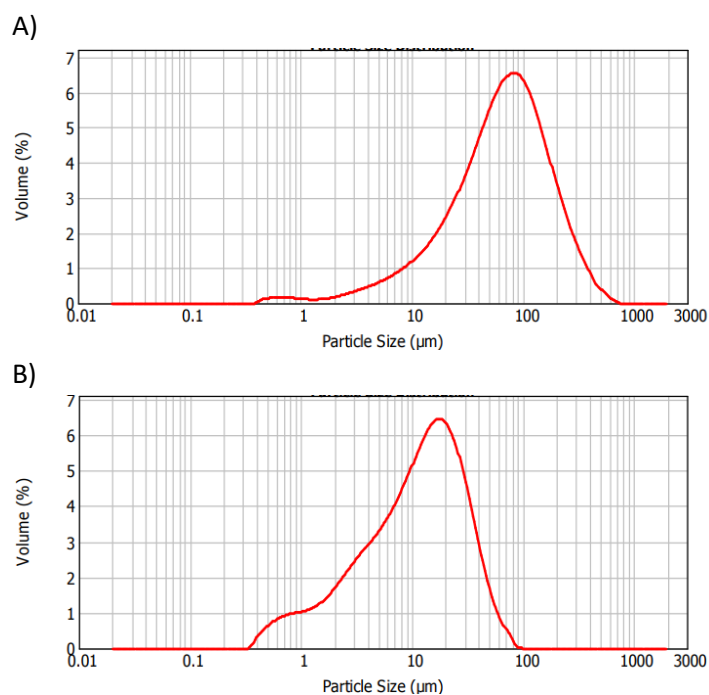


Figure S1. Particle size distribution analysis for fly ash sample FA-B 2018: A) before grinding, B) after 4 hrs grinding.

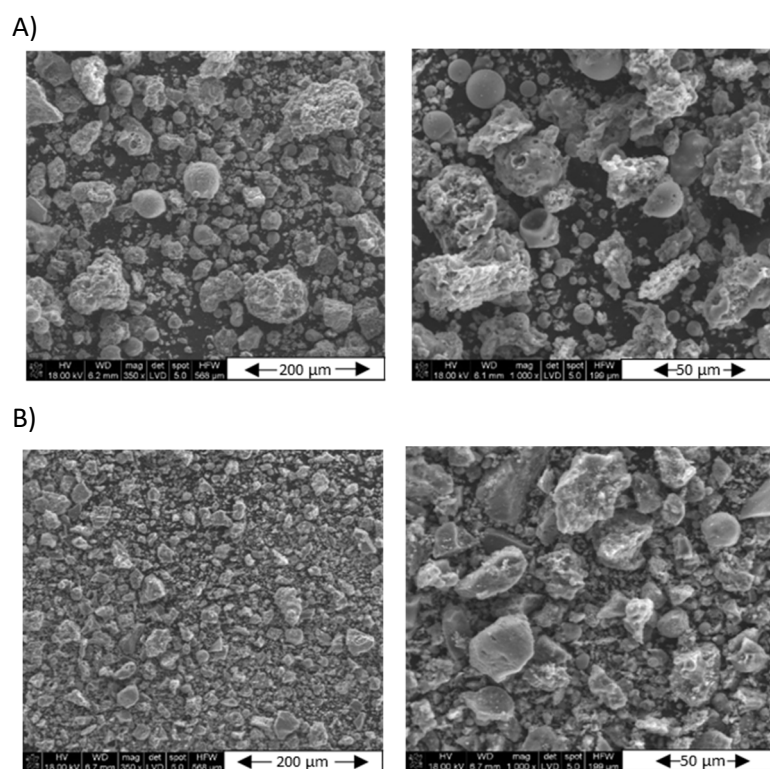


Figure S2. SEM morphology of the fly ash sample FA-B 2018: A) before grinding, B) after 4 hrs grinding.

Table S1. Qualitative and quantitative “oxide” analysis of fly ash sample FA-B 2018.

No.	Component	Content [wt. %]
1	SiO ₂	37.7
2	Al ₂ O ₃	26.4
3	CaO	20.9
4	Fe ₂ O ₃	7.38
5	TiO ₂	0.89
6	SO ₃	2.74
7	MgO	1.01
8	K ₂ O	0.11
9	P ₂ O ₅	0.44
10	SrO	0.06
11	BaO	0.05
12	Mn ₃ O ₄	0.05
13	Na ₂ O	0.04
SUM		99.03
Loss on Ignition [wt. %]		1.26

Table S2. Phase composition for fly ash sample FA-B 2018.

No.	Component	Content [wt. %]
1	Low silicon dioxide (SiO ₂)	14.3
2	Akermanite (Ca ₂ Mg[Si ₂ O ₇])- Gehlenite (Ca ₂ Al[(Si,Al) ₂ O ₇])	41.8
3	Andesine Sodium aluminosilicate (NaAlSi ₃ O ₈) and Calcium aluminosilicate (CaAl ₂ Si ₂ O ₈)	29.6
4	Potassium aluminosilicate (AlK ₆ Si ₂)	6.0
5	Mayenite (Ca ₁₂ Al ₁₄ O ₃)	6.3
6	Leucite (K[AlSi ₂ O ₆])	1.0
7	Zeolite MCM-70	1.1

Table S3. SEM-EDS analysis of the chemical composition of the fly ash FFA-B 2018 fractions in terms of the content of oxides and carbon.

<i>Grain size/fraction</i>	Σ oxides [wt. %]	Carbon [wt. %]
<i>FA-63</i>	85.6	14.4
<i>FA-125</i>	72.7	27.3
<i>FA-250</i>	62.9	37.1
<i>FA>0.250</i>	49.1	50.9

Table S4. “Oxide” analysis of the fly ash FFA-B 2018 fractions.

<i>Fraction/ component</i>	FA-63 [wt. %]	FA-125 [wt. %]	FA-250 [wt. %]	FA>0.250 [wt.%]
<i>SiO₂</i>	20.618	25.223	25.471	18.207
<i>CaO</i>	27.941	17.489	11.772	9.245
<i>Al₂O₃</i>	19.160	18.911	16.865	11.620
<i>Fe₂O₃</i>	8.897	5.931	4.753	4.168
<i>SO₃</i>	6.076	2.462	1.534	3.213
<i>TiO₂</i>	0.941	1.192	1.246	1.239
<i>MgO</i>	0.914	0.065	0.459	0.326

Table S5. Phase composition of various fractions of the fly ash FFA-B 2018 sample.

<i>Fraction/ Component</i>	FA-63 [wt.%]	FA-125 [wt.%]	FA-250 [wt.%]	FA>0.250 [wt.%]
<i>Quartz (SiO₂)</i>	10.0	23.8	39.2	46.9
<i>Akermanite/ Gehlenite Ca₂Mg(Si₂O₇) Ca₂Al[(Si₂Al)₂O₇]</i>	30.9	13.1	9.1	4.1
<i>Albite NaAlSi₃O₈</i>	20.0	24.0	19.2	11.7
<i>Limestone CaO</i>	6.6	1.3	-	-
<i>Calcite CaCO₃</i>	2.2	1.3	1.2	-
<i>Hematite α-Fe₂O₃</i>	5.0	1.6	1.3	-
<i>Anhydrite CaSO₄</i>	10.0	2.2	2.1	1.8
<i>Brownmillerite Ca₂(Al₂Fe)₂O₅</i>	6.0	1.7	2.0	-
<i>Mullite 3Al₂O₃·2SiO₂</i>	9.4	30.9	25.9	35.5

Table S6. Specific surface area analysis of fly ash FA-B 2018 sample.

<i>Sample</i>	CTAB [m²/g]	BET [m²/g]	BET [m²/g] after grinding
<i>FA-B</i>	4.0±0.1	11.1±0.1	11.3±0.1

Table S7. Results of the BET surface area for fly ash FFA-B 2018 sample divided into fractions.

<i>Fraction</i>	BET [m²/g]
<i>FA-63</i>	5.3
<i>FA-125</i>	10.5
<i>FA-250</i>	17.6
<i>FA>0.250</i>	45.1

Table S8. Surface energy of fly ash FA-B 2018 sample.

Surface energy [mJ/m²]	
<i>Dispersive component</i>	22.6
<i>Polar component</i>	11.7
<i>Total value</i>	34.3