CLAIMS

What is claimed is:

1. A method of making a cementitious mixture for building materials comprising:

(a) obtaining a cementitious mixture comprising a calcium compound and ordinary Portland cement (OPC) and optionally supplementary cementitious material (SCM), wherein the dosage of the calcium compound is 6.5 wt. % to 15 wt. % of the total binder content of the cementitious mixture; and

(b) adding water to the cementitious mixture,

wherein the calcium compound consists essentially of (i) calcium oxide, or (ii) calcium hydroxide, or (iii) both calcium oxide and calcium hydroxide, and

wherein the cementitious mixture has a total binder content of 300 kg/m^3 to 500 kg/m^3; 200 kg/m^3 to 700 kg/m^3, 300 kg/m^3 to 700 kg/m^3, 400 kg/m^3 to 700 kg/m^3, 200 kg/m^3 to 600 kg/m^3, 300 kg/m^3 to 600 kg/m^3, 400 kg/m^3 to 600 kg/m^3, 500 kg/m^3 to 600 kg/m^3, or 200 kg/m^3 to 300 kg/m^3, optionally 300 kg/m^3 to 500 kg/m^3.

2. A method of making a cementitious mixture for building materials comprising obtaining a cementitious mixture comprising a calcium compound and ordinary Portland cement (OPC) and optionally supplementary cementitious material (SCM), and mixing the cementitious mixture, wherein the dosage of the calcium compound is 6.5 wt. % to 15 wt. % of the total binder content of the cementitious mixture,

wherein the calcium compound consists essentially of (i) calcium oxide, or (ii) calcium hydroxide, or (iii) both calcium oxide and calcium hydroxide, and

wherein the cementitious mixture has a total binder content of 300 kg/m^3 to 500 kg/m^3; 200 kg/m^3 to 700 kg/m^3, 300 kg/m^3 to 700 kg/m^3, 400 kg/m^3 to 700 kg/m^3, 200 kg/m^3 to 600 kg/m^3, 300 kg/m^3 to 600 kg/m^3, 400 kg/m^3 to 600 kg/m^3, 500 kg/m^3 to 600 kg/m^3, or 200 kg/m^3 to 300 kg/m^3, optionally 300 kg/m^3 to 500 kg/m^3.

3. A method of making a concrete mixture for building materials comprising:

(a) obtaining a cementitious mixture comprising a calcium compound, ordinary Portland cement (OPC), fine aggregates, and coarse aggregates, and optionally supplementary cementitious material (SCM), wherein the dosage of the calcium compound is 6.5 wt. % to 15 wt. % of the total binder content of the cementitious mixture; and

(b) adding water to the cementitious mixture,

wherein the calcium compound consists essentially of (i) calcium oxide, or (ii) calcium hydroxide, or (iii) both calcium oxide and calcium hydroxide, and

wherein the cementitious mixture has a total binder content of 300 kg/m^3 to 500 kg/m^3; 200 kg/m^3 to 700 kg/m^3, 300 kg/m^3 to 700 kg/m^3, 400 kg/m^3 to 700 kg/m^3, 200 kg/m^3 to 600 kg/m^3, 300 kg/m^3 to 600 kg/m^3, 400 kg/m^3 to 600 kg/m^3, 500 kg/m^3 to 600 kg/m^3, or 200 kg/m^3 to 300 kg/m^3, optionally 300 kg/m^3 to 500 kg/m^3.

4. A method of making a concrete mixture for building materials comprising obtaining a cementitious mixture comprising a calcium compound, ordinary Portland cement (OPC), fine aggregates, and coarse aggregates, and optionally supplementary cementitious material (SCM), and mixing the cementitious mixture, wherein the dosage of the calcium compound is 6.5 wt. % to 15 wt. % of the total binder content of the cementitious mixture,

wherein the calcium compound consists essentially of (i) calcium oxide, or (ii) calcium hydroxide, or (iii) both calcium oxide and calcium hydroxide, and

wherein the cementitious mixture has a total binder content of 300 kg/m^3 to 500 kg/m^3; 200 kg/m^3 to 700 kg/m^3, 300 kg/m^3 to 700 kg/m^3, 400 kg/m^3 to 700 kg/m^3, 200 kg/m^3 to 600 kg/m^3, 300 kg/m^3 to 600 kg/m^3, 400 kg/m^3 to 600 kg/m^3, 500 kg/m^3 to 600 kg/m^3, or 200 kg/m^3 to 300 kg/m^3, optionally 300 kg/m^3 to 500 kg/m^3.

5. The method of any one of claims 1-4, wherein the total binder content of the cementitious mixture comprises 60 wt. % to 79 wt. % OPC and 21 wt. % to 40 wt. % SCM; 20 wt. % to 100 wt. % OPC and 0 wt. % to 80 wt. % SCM; 80 wt. % to 99 wt. % OPC and 1 wt. % to 20 wt. % SCM; or 20 wt. % to 59 wt. % OPC and 41 wt. % to 80 wt. % SCM.

6. The method of any one of claims 1-2, wherein the dosage of the calcium compound is 8 wt. % to 12 wt. %, 6.5% to 15 wt. %, 6.5 wt. % to 12 wt. %, 6.5 wt. % to 10 wt. %, 6.5 wt. % to 8 wt. %, 8 wt. % to 15 wt. %, 8 wt. % to 10 wt. %, or 10 wt. % to 15 wt. % of the total binder content of the cementitious mixture, optionally 8 wt. % to 12 wt. %.

7. The method of any one of claims 1-6, wherein the calcium compound has a particle size of 1 mm to 2.5 mm, greater than 0 to 0.2 mm, greater than 0 mm to 0.75 mm, 0.002 mm to 0.75 mm, 0.075 mm to 1 mm, 0.075 mm to 1.5 mm, 0.075 mm to 5 mm, 0.075 mm to 0.5 mm, 0.15 mm to 4 mm, 0.5 mm to 3.5 mm, 0.5 mm to 1.5 mm, 1.5 mm to 2.5 mm, 2.5 mm to 3.5 mm, 4 mm to 5 mm, 4

mm to 6 mm, 4 mm to 7 mm, 4 mm to 8 mm, 4 mm to 9 mm, 4 mm to 10 mm, greater than 4 mm to 10 mm, or 1 mm to 10 mm, optionally 0.075 mm to 1.5 mm, optionally 1.5 mm to 2.5 mm, optionally 1 mm to 2.5 mm, or optionally 2.5 mm to 10 mm.

8. The method of any one of claims 1-7, wherein the calcium compound has a particle size from 6.35 mm to 63 mm, or from 63 mm to 204 mm.

9. The method of claim 8, wherein the calcium compound comprises 67 wt% to 100 wt% calcium oxide and 0 wt% to 33 wt% calcium hydroxide, 33 wt% to 66 wt% calcium oxide and 34 wt% to 67 wt% calcium hydroxide, or 0 wt% to 32 wt% calcium oxide and 68 wt% to 100 wt% calcium hydroxide.

10. The method of any one of claims 1-9, wherein the calcium compound comprises one or more of high calcium quicklime, dolomitic quicklime, calcium hydrated lime, or dolomitic hydrated lime.

11. The method of any one of claims 1-10, wherein the SCM comprises one or more materials selected from fly ash, ground granulated blast-furnace slag, metakaolin, microsilica, natural pozzolana, rice husks, palm oil ash (POA), and glass powder (GP).

12. The method of any one of claims 1, 3 or 5-11, wherein step b) occurs after step a), or step a) and step b) occur simultaneously.

13. The method of any one of claims 1, 2, or 5-12, wherein the cementitious mixture further comprises one or more of fine aggregates and coarse aggregates, optionally wherein the fine aggregates comprise one or more of sand, crushed stone, silt, stone dust, and clay.

14. The method of claim 3 or 4, wherein the fine aggregates comprise one or more of sand, crushed stone, silt, stone dust, and clay.

15. The method of any one of claims 1-14, wherein the method further comprises adding one or more plasticizers and/or retarders to the cementitious mixture.

16. The method of any one of claims 1-15, wherein the method produces a hardened cementitious material selected from grout, mortar, and concrete, optionally wherein the hardened cementitious material comprises sand, optionally wherein the hardened cementitious material comprises gravel.

17. The method of claim 16, wherein the hardened cementitious material further comprises one or more plasticizers and/or one or more retarders.

18. A building material comprising the hardened cementitious material of claim 16 or 17, optionally wherein the building material comprises reinforced concrete.

19. A building material comprising the hardened cementitious material of claim 16, wherein the building material further comprises Opus signinum (Cocciopesto).

20. A concrete admixture prepared by the method of any one of claims 1-16.

21. A blended cement prepared by the method of any one of claims 2 or 4-16.

22. A cementitious mixture prepared by the method of any one of claims 1-16.

23. A concrete for building materials comprising a cementitious mixture comprising a calcium compound, ordinary Portland cement (OPC), optionally supplementary cementitious material (SCM), fine aggregates, coarse aggregates, and water, optionally wherein the fine aggregates comprise one or more of sand, crushed stone, silt, stone dust, and clay, wherein the dosage of the calcium compound is 6.5 wt. % to 15 wt. % of the total binder content of the cementitious mixture, optionally comprising a reinforcement,

wherein the calcium compound consists essentially of (i) calcium oxide, or (ii) calcium hydroxide, or (iii) both calcium oxide and calcium hydroxide, and

wherein the cementitious mixture has a total binder content of 300 kg/m^3 to 500 kg/m^3; 200 kg/m^3 to 700 kg/m^3, 300 kg/m^3 to 700 kg/m^3, 400 kg/m^3 to 700 kg/m^3, 200 kg/m^3 to 600 kg/m^3, 300 kg/m^3 to 600 kg/m^3, 400 kg/m^3 to 600 kg/m^3, 500 kg/m^3 to 600 kg/m^3, or 200 kg/m^3 to 300 kg/m^3, optionally 300 kg/m^3 to 500 kg/m^3.

24. The concrete of claim 23, wherein the concrete further comprises supplementary cementitious material (SCM), optionally wherein the SCM comprises one or more materials selected from fly ash, ground granulated blast-furnace slag, metakaolin, microsilica, natural pozzolana, rice husks, palm oil ash (POA), and glass powder (GP).