CLAIMS

1. A cement additive derived from a material comprising perovskite and silica, wherein the cement additive comprises calcium sulfate and silica.
2. A cement additive as claimed in claim 1, wherein the cement additive comprises a composition (A) obtained from a material comprising perovskite and silica, wherein the composition (A) comprises calcium sulfate and silica.
3. A cement additive as claimed in claim 1 or 2, wherein the cement additive comprises from approximately 40% to approximately 80% calcium sulfate and from approximately 10% to approximately 50% silica.
4. A cement additive as claimed in any one of claims 1 to 3, wherein the cement additive comprises a ratio of silica to calcium sulfate of from approximately 0.2 to approximately 1.2.
5. A cement additive as claimed in any one of claims 2 to 4, wherein the cement additive consists essentially of the composition (A).
6. A cement additive as claimed in any one of claims 2 to 4, wherein the cement additive comprises one or more additional materials.
7. A cement additive as claimed in claim 6, wherein the one or more additional materials comprises a composition (B) obtained in a process for the recovery of one or more metal from a material comprising perovskite and silica.
8. A cement additive as claimed in claim 7, wherein composition (B) is a by-product of the process for recovery of one or more metal from a material comprising perovskite and silica.
9. A cement additive as claimed in claim 8, where the one or more additional materials comprises a feedstock used in a method for the recovering of one or more metal, or a derivative thereof.
10. A method of making a cement additive, the method comprising at least the steps of:
    i. sulphating a material comprising perovskite and silica to form a sulfated material;
    ii. separating a first composition comprising calcium sulfate and silica from one or more other components contained in the suflated material.
11. A method as claimed in claim 10, wherein the method further comprises at least the steps of:

iii. combining the first composition comprising calcium sulfate and silica with water and at least one compound to adjust the pH to from approximately 4 to approximately 9;

iv. separating solids and liquids to obtain a second composition comprising calcium sulfate and silica.

12. A method as claimed in claim 10, wherein the method further comprises at least the steps of:

iii. combining the first composition comprising calcium sulfate and silica with water;

iv. separating solids and liquids to obtain a second composition;

v. combining the second composition with water and at least one compound to adjust the pH to from approximately 4 to approximately 9;

vi. separating solids and liquids the combined second composition and water to obtain a third composition comprising calcium sulfate and silica.

13. A method as claimed in claims 11 or 12, wherein the at least one compound to adjust the pH is chosen from calcium sulfate and calcium oxide.

14. A method as claimed in any one of claims 11 to 13, wherein the method further comprises the step of drying the first, second or third composition comprising calcium sulfate and silica.

15. A method as claimed in any one of claims 10 to 14, wherein the material comprising perovskite and silica has a particle size of less than 180µm or a D90 approximately <250 microns.

16. A method as claimed in any one of claims 10 to 15, wherein the method further comprises the step of combining the first composition of claim 10, the second composition of claim 11 or the third composition of claim 12 with one or more additional material to provide the cement additive.

17. A method as claimed in claim 16, wherein the method further comprises the step of combining the first composition of claim 10, the second composition of claim 11 or the third composition of claim 12 with a composition (B) to provide the cement additive.

18. A method as claimed in claim 17, wherein composition (B) is a composition obtained in a process for the recovery of one or more metal from a material comprising perovskite and silica.

19. A method as claimed in claim 18, wherein composition (B) is a by-product of a process for recovery of one or more metal from a material comprising perovskite and silica.
20. A method as claimed in any one of claims 16 to 19, wherein the one or more additional materials or composition (B) comprises an ore, an ore concentrate, a slag and/or red mud.
21. A cement additive made by a method of any one of claims 10 to 20.
22. A cement additive or a method as claimed in any one of claims 1 to 21, wherein the material comprising perovskite and silica is chosen from one or more of an iron making slag, an ore, an ore concentrate, a VTM slag, and red mud.
23. A cement comprising clinker and a cement additive of any one of claims 1 to 9, 21 or 22.
24. A cement as claimed in claim 23 wherein the cement consists essentially of: clinker and a cement additive of any one of claims 1 to 9, 21 or 22; or clinker, a cement additive of any one of claims 1 to 9, 21 or 22 and one or both of limestone and a grinding aid.
25. A cement as claimed in any one of claims 21 to 24, wherein the cement is capable of producing a hardened mortar with a compressive strength of at least approximately 30MPa at 7 days.
26. A cement as claimed in any one of claims 21 to 25, wherein the cement is capable of producing a hardened mortar with a compressive strength of at least approximately 45MPa at 28 days.
27. A cementitious product comprising the cement additive of any one of claims 1 to 10, 21 or 22 or the cement of any one of claims 23 to 26.
28. A cementitious product as claimed in claim 27, wherein the cementitious product is chosen from the group comprising concrete, mortar, grout and stucco.
29. An article comprising a hardened cementitious product as claimed in claim 27 or 28.
30. A method for making cement, the method comprising at least the step of combining a cement additive as claimed in any one of claims 1 to 10, 21 or 22 with clinker.
31. A method for making cement, the method comprising at least the steps of any one of claims 10 to 20 and the further step of combining the cement additive with clinker.
32. A cement made by a method of any one of claim 30 or 31.
33. A method of making a cementitious product, the method comprising at least the step of combining a cement as claimed in any one of claims 23 to 26 with a) water or b) an aggregate and water.

34. A method of making a cementitious product, the method comprising at least the steps of the method of claim 31 to provide a cement and the further step of combining the cement with a) water or b) an aggregate and water.

35. A method as claimed in claim 34, wherein the cementitious product is chosen from the group comprising concrete, mortar, stucco, and grout.

36. A cementitious product made by a method as claimed in any one of claims 33 to 35.

CLAIMS

1. A cement additive derived from a material comprising perovskite and silica, in which the cement additive comprises calcium sulfate and silica.

2. A cement additive as claimed in Claim 1, in which the cement additive comprises a composition (A) obtained from a material comprising perovskite and silica, in which the composition (A) comprises calcium sulfate and silica.

3. A cement additive as claimed in Claim 1 or 2, in which the cement additive comprises from approximately 40% to approximately 80% calcium sulfate and from approximately 10% to approximately 50% silica.

4. A cement additive as claimed in Claim 1, 2 or 3, in which the cement additive comprises a ratio of silica to calcium sulfate of from approximately 0.2 to approximately 1.2.

5. A cement additive as claimed in Claim 2, 3 or 4, in which the cement additive consists essentially of the composition (A).

6. A cement additive as claimed in Claim 2, 3 or 4, in which the cement additive comprises one or more additional materials.

7. A cement additive as claimed in Claim 6, in which the one or more additional materials comprises a composition (B) obtained in a process for the recovery of one or more metal from a material comprising perovskite and silica.

8. A cement additive as claimed in Claim 7, in which composition (B) is a by-product of the process for recovery of one or more metal from a material comprising perovskite and silica.

9. A cement additive as claimed in Claim 6, where the one or more additional materials comprises a feedstock used in a method for the recovering of one or more metal, or a derivative thereof.

10. A method of making a cement additive, the method comprising at least the steps of:

(i) sulphating a material comprising perovskite and silica to form a sulfated material;

(ii) separating a first composition comprising calcium sulfate and silica from one or more other components contained in the suflated material.

11. A method as claimed in Claim 10, in which the method further comprises at least the steps of:

(iii) combining the first composition comprising calcium sulfate and silica with water and at least one compound to adjust the pH to from approximately 4 to approximately 9;

(iv) separating solids and liquids to obtain a second composition comprising calcium sulfate and silica.

12. A method as claimed in Claim 10, in which the method further comprises at least the steps of:

(iii) combining the first composition comprising calcium sulfate and silica with water;

(iv) separating solids and liquids to obtain a second composition;

(v) combining the second composition with water and at least one compound to adjust the pH to from approximately 4 to approximately 9;

(vi) separating solids and liquids to obtain a third composition comprising calcium sulfate and silica.

13. A method as claimed in Claim 11 or 12, in which the at least one compound to adjust the pH is chosen from calcium hydroxide and calcium oxide.

14. A method as claimed in Claim 11, 12 or 13, in which the method further comprises the step of drying the first, second or third composition comprising calcium sulfate and silica.

15. A method as claimed in any of Claims 10 to 14, in which the material comprising perovskite and silica has an average particle size of less than 180μm or a D90 approximately <250 microns.

16. A method as claimed in any of Claims 10 to 15, in which the method further comprises the step of combining the first composition of Claim 10, the second composition of Claim 11 or the third composition of Claim 12 with one or more additional material to provide the cement additive.

17. A method as claimed in Claim 16, in which the method further comprises the step of combining the first composition of Claim 10, the second composition of Claim 11 or the third composition of Claim 12 with a composition (B) to provide the cement additive.

18. A method as claimed in Claim 17, in which composition (B) is a composition obtained in a process for the recovery of one or more metal from a material comprising perovskite and silica.

19. A method as claimed in Claim 18, in which composition (B) is a by-product of a process for recovery of one or more metal from a material comprising perovskite and silica.

20. A method as claimed in any of Claims 16 to 19, in which the one or more additional materials or composition (B) comprises an ore, an ore concentrate, a slag and/or red mud.

21. A cement additive made by a method of any of Claims 10 to 20.

22. A cement additive or a method as claimed in any of Claims 1 to 21, in which the material comprising perovskite and silica is chosen from one or more of an iron making slag, an ore, an ore concentrate, a VTM slag, and red mud.

23. A cement comprising clinker and a cement additive of any of Claims 1 to 9, 21 and 22.

24. A cement as claimed in Claim 23 in which the cement consists essentially of: clinker and a cement additive of any of Claims 1 to 9, 21 and 22; or, clinker, a cement additive of any of Claims 1 to 9, 21 and 22 and one or both of limestone and a grinding aid.

25. A cement as claimed in any of Claims 21 to 24, in which the cement is capable of producing a hardened mortar with a compressive strength of at least approximately 30MPa at 7 days.

26. A cement as claimed in any of Claims 21 to 25, in which the cement is capable of producing a hardened mortar with a compressive strength of at least approximately 45MPa at 28 days.

27. A cementitious product comprising a cement additive of any of Claims 1 to 9, 21 and 22 or a cement of any of Claims 23 to 26.

28. A cementitious product as claimed in Claim 27, in which the cementitious product is chosen from the group comprising concrete, mortar, grout and stucco.

29. An article comprising a hardened cementitious product as claimed in Claim 27 or 28.

30. A method for making cement, the method comprising at least the step of combining a cement additive as claimed in any of Claims 1 to 9, 21 and 22 with clinker.

31. A method for making cement, the method comprising at least the steps of any of Claims 10 to 20 and the further step of combining the cement additive with clinker.

32. A cement made by a method of any of Claim 30 or 31.

33. A method of making a cementitious product, the method comprising at least the step of combining a cement as claimed in any of Claims 23 to 26 with (a) water or (b) an aggregate and water.

34. A method of making a cementitious product, the method comprising at least the steps of the method of Claim 31 to provide a cement and the further step of combining the cement with (a) water or (b) an aggregate and water.

35. A method as claimed in Claim 33 or 34, in which the cementitious product is chosen from the group comprising concrete, mortar, stucco, and grout.

36. A cementitious product made by a method as claimed in Claim 33, 34 or 35.