CLAIMS

1. A cementitious composition comprising:

    a mixture comprising:

        a binder component comprising reactive magnesium oxide cement;

        a water reducing agent;

        a viscosity agent; and

        water; and

    one or more fibers dispersed in the mixture;

    wherein a percentage of reactive magnesium oxide cement in the binder component by mass is any one percentage value selected from range from 40% to 100%;

    wherein a percentage of the water reducing agent relative to the binder component by mass is any one percentage value selected from 2% to 4%;

    wherein a percentage of the viscosity agent relative to the binder component by mass is any one percentage value selected from a range from 0.05% to 5%; and

    wherein the cementitious composition is configured to sequestrate atmospheric carbon dioxide during curing.

2. The cementitious composition according to claim 1,

    wherein the binder component further comprises any one or more binders selected from a group consisting of hydraulic cement, coal fly ash, silica fume, and ground granulated blast furnace slag.

3. The cementitious composition according to claim 1 or claim 2,

    wherein a mass ratio of water to binder component is any one ratio selected from a range from 0.4 to 0.8.

4. The cementitious composition according to any one of claims 1 to 3,
wherein the water reducing agent is sodium hexametaphosphate solution.

5. The cementitious composition according to any one of claims 1 to 4,
wherein the viscosity controlling agent is hydroxypropyl methylcellulose.

6. The cementitious composition according to any one of claims 1 to 5,
wherein the one or more fibers are any one type of fibers selected from a group consisting of metallic fibers, polymeric fibers, and natural fibers.

7. The cementitious composition according to any one of claims 1 to 6,
wherein a percentage of the one or more fibers in the cementitious composition by volume is any one percentage value selected from a range from 0.5% to 10%.

8. The cementitious composition according to any one of claims 1 to 7,
wherein each of the one or more fibers comprises a coating of an oiling agent.

9. A cement-based structure comprising:
a matrix comprising one or more hydrated magnesium carbonates; and
one or more fibers embedded in the matrix;
wherein the matrix is formed by curing a cementitious composition, the cementitious composition comprising:
a mixture comprising:
a binder component comprising reactive magnesium oxide cement;
a water reducing agent;
a viscosity agent; and
water; and
one or more fibers dispersed in the mixture;

wherein a percentage of reactive magnesium oxide cement in the binder component by mass is any one percentage value selected from range from 40% to 100%;

wherein a percentage of the water reducing agent relative to the binder component by mass is any one percentage value selected from 2% to 4%;

wherein a percentage of the viscosity agent relative to the binder component by mass is any one percentage value selected from a range from 0.05% to 5%; and

wherein the cementitious composition is configured to sequestrate atmospheric carbon dioxide during curing.

10. A method of forming a cementitious composition, the method comprising:

forming a mixture comprising:

a binder component comprising reactive magnesium oxide cement;

a water reducing agent;

a viscosity agent; and

water; and

dispersing one or more fibers in the mixture;

wherein a percentage of reactive magnesium oxide cement in the binder component by mass is any one percentage value selected from range from 40% to 100%;

wherein a percentage of the water reducing agent relative to the binder component by mass is any one percentage value selected from 2% to 4%;

wherein a percentage of the viscosity agent relative to the binder component by mass is any one percentage value selected from a range from 0.05% to 5%; and

wherein the cementitious composition is configured to sequestrate atmospheric carbon dioxide during curing.

11. The method according to claim 10,

wherein the binder component further comprises any one or more binders selected from a group consisting of hydraulic cement, coal fly ash, silica fume, and ground granulated blast furnace slag.

12. The method according to claim 10 or claim 11,

wherein each of the one or more fibers comprises a coating of an oiling agent.

13. A method of forming a cement-based structure, the method comprising:

forming a matrix comprising one or more hydrated magnesium carbonates;

wherein one or more fibers is embedded in the matrix;

wherein the matrix is formed by curing a cementitious composition, the cementitious composition comprising:

a mixture comprising:

a binder component comprising reactive magnesium oxide cement;

a water reducing agent;

a viscosity agent; and

water; and

one or more fibers dispersed in the mixture;

wherein a percentage of reactive magnesium oxide cement in the binder component by mass is any one percentage value selected from range from 40% to 100%;

wherein a percentage of the water reducing agent relative to the binder component by mass is any one percentage value selected from 2% to 4%;

wherein a percentage of the viscosity agent relative to the binder component by mass is any one percentage value selected from a range from 0.05% to 5%; and

wherein the cementitious composition is configured to sequestrate atmospheric carbon dioxide during curing.