towards the pulp or away from the pulp. Said change in the movement of dentinal fluid kicks in the signals in the nerve tissues in the pulp and results in a feeling of pain.

[004] Emerging research on determining etiologic factors in the causation of the disease, its diagnosis and its treatment have uncovered many materials and methods in order to reduce or remove sensitivity. Such materials usually exert their effects through "sealing dentinal tubules" or through "disturbing the transmission of nerve impulses". Some of these materials include the use of toothpastes containing potassium salts, fluoride composites, resins, laser; bioglass, and so on. For instance, US20140127142A1 relates to a toothpaste composition for DH that effectively prevents pain attributed to DH, instantaneously and sufficiently seals the openings of dentinal tubules in an exposed dentinal surface. Said toothpaste composition comprises, a powder having a sparingly water-soluble property; a desensitizing agent; and water.

[005] JP5816352B2 relates to a DH inhibitor in which a liquid or water-based paste is mainly composed of tetracalcium phosphate particles (A), phosphoric acid alkali metal salt (B), acidic calcium phosphate particles (C), and water. Said inhibitor composition is used to seal dentinal tubules by rubbing them into the dentin surface.

[006] Notwithstanding the ongoing research and already established methods, the problem of DH is evidently increasing in different age groups. Further, the failure of conventional medicaments and methods to seal the dentinal tubule opening for a longer period of time is leading to consistent problems. Due to aforesaid reasons, disturbing the transmission of nerve impulses from the exposed dentine surface to nerve tissues (pulp) seems to be a more appropriate and better solution for the prevention or eradication of DH. Thus, there is still a dire need in the state of art to develop methods or medicaments based on disrupting the transmission of nerve impulses, thereby facilitating more permanent and longtime prevention of pain caused by DH.

SUMMARY

[007] In an aspect of the present disclosure, a nanostructure comprising: 50 to 80 % (w/w) of a magnetic material and 20 to 50 % (w/w) of calcium silicate, wherein the magnetic particle forms a core of the nanostructure and calcium silicate forms a shell of the nanostructure; the nanostructure has particle size in a range of 50 to 500 nm; surface area in a range of 0.01 μm^2 to 100 μm^2; and pore size in a range of 2 nm to 20 nm.

[008] In another aspect of the present disclosure, there is provided a nanocomposite comprising: a) 95 to 99.9 % (w/w) of the nanostructure comprising (i) 50 to 80 % (w/w) of a magnetic material and (ii) 20 to 50 % (w/w) of calcium silicate; and b) 0.1 to 5% (w/w) of an additive selected from calcium oxide, phosphorus, sodium, strontium, phosphates, fluorine, or combinations thereof, wherein the magnetic particle forms a core of the nanostructure and calcium silicate forms a shell of the nanostructure; the nanostructure has particle size in a range of 50 to 500 nm; surface area in a range of 0.01 μm^2 to 100 μm^2; and pore size in a range of 2 nm to 20 nm.

[009] In another aspect of the present disclosure, there is provided a process for preparing the nanostructure, the process comprising: (a) mixing an oxidizing agent, and a magnetic metal salt in a first solvent followed by addition of a base and a silicate precursor to obtain a first mixture; (b) contacting a calcium salt with the first mixture in the presence of a second solvent to obtain a second mixture; and (c) annealing the second mixture at a temperature in a range of 550 to 650 ℃ to obtain a glassy calcium silicate as the shell of nanostructure, followed by filtration and drying to obtain the nanostructure, wherein the nanostructure has particle size in a range of 50 to 500 nm; surface area in a range of 0.01 μm^2 to 100 μm^2; and pore size in a range of 2 nm to 20 nm.

[0010] In another aspect of the present disclosure, there is provided a process of preparing the nanocomposite, the process comprising: a) preparing the nanostructure as disclosed herein; and b) immersing the nanostructure in a solution comprising a compound selected from calcium oxide, strontium salt, calcium fluoride, sodium

fluoride, phosphates, or combinations thereof, at a temperature in a range of 20 to 80°C to obtain the nanocomposite.

[0011] In another aspect of the present disclosure, there is provided a gel comprising: a) 0.1 to 10 % (w/w) of the nanostructure or the nanocomposite as disclosed herein; b) 0.1 to 20% (w/w) of a hydrogel base; c) 0.1 to 1% (w/w) of a pH modifier; d) 5 to 10% (w/w) of a humectant; e) 80 to 99% (w/w) of a swelling agent; f) 0.1% to 15% (w/w) of calcium oxide; and g) optionally 1 to 5% (w/w) of a stabilizer.

[0012] In another aspect of the present disclosure, there is provided a process for preparing the gel, the process comprising: a) mixing the nanostructure or the nanocomposite as disclosed herein with a hydrogel base and a swelling agent to obtain a first solution; b) adding a pH modifier and calcium oxide powder to the first solution to obtain a second solution; and c) adding a humectant and optionally a stabilizer to obtain the gel.

[0012a] In another aspect of the present disclosure, there is provided the use of a nanostructure as disclosed herein or the nanocomposite as disclosed herein or the gel as disclosed herein in the manufacture of a medicament for treating dental hypersensitivity.

[0012b] In another aspect of the present disclosure, there is provided the use of a nanostructure as disclosed herein or the nanocomposite as disclosed herein or the gel as disclosed herein, the use comprising the nanostructure as disclosed herein or the nanocomposite as disclosed herein or the gel as disclosed herein in the manufacture of a medicament to be applied, driven, and positioned to an infected dentinal tubule using a magnetic cap.

[0013] In an example of the present disclosure, there is provided a method of treating dental hypersensitivity, the method comprising administering the nanostructure or the nanocomposite or the gel as disclosed herein to a subject suffering from dental hypersensitivity.

[0014] In another example of the present disclosure, there is provided a method of administering the nanostructure or the nanocomposite or the gel as disclosed herein, the method comprising applying, driving, and positioning the nanostructure or the nanocomposite or the gel as disclosed herein to an infected dentinal tubule using a magnetic cap.

[0015] In another aspect of the present disclosure, there is provided a device comprising the nanostructure or the nanocomposite or the gel as disclosed herein and a magnetic cap.

[0016] In another aspect of the present disclosure, there is provided a use of the nanostructure or the nanocomposite or the gel as disclosed herein.

[0016a] In another aspect of the present disclosure, there is provided a nanostructure as disclosed herein or the nanocomposite as disclosed herein or the gel as disclosed herein for use in therapy.

I/ We claim:

1. A nanostructure comprising:

   50 to 80% (w/w) of a magnetic material; and 20 to 50% (w/w) of calcium silicate,

   wherein the magnetic particle forms a core of the nanostructure and calcium silicate forms a shell of the nanostructure;

   the nanostructure has particle size in a range of 50 to 500 nm; surface area in a range of 0.01 μm^2 to 100 μm^2; and pore size in a range of 2 nm to 20 nm.

2. The nanostructure as claimed in claim 1, wherein the nanostructure encompass shape selected from sphere, ellipsoids, dumb-bell shaped linked spheres, multiple linked spheres, chains, rods, helices, or combinations thereof.
3. The nanostructure as claimed in claim 1, wherein the magnetic material is selected from iron, iron oxide, nickel, nickel oxide, cobalt, cobalt oxide, or combinations thereof.
4. The nanostructure as claimed in claim 1, wherein the core has particle size in a range of 5 to 500 nm.
5. The nanostructure as claimed in claim 1, wherein the nanostructure has zeta potential in a range of -20 to -40 mV.
6. The nanostructure as claimed in claim 1, wherein the nanostructure heals dental hypersensitivity and triggers bone regeneration and growth.
7. A nanocomposite comprising:

   a) 95 to 99.9 % (w/w) of the nanostructure comprising (i) 50 to 80 % (w/w) of a magnetic material and (ii) 20 to 50 % (w/w) of calcium silicate; and

   b) 0.1 to 5% (w/w) of an additive selected from calcium oxide, phosphorus, sodium, strontium, phosphates, fluorine, or combinations thereof,

wherein the magnetic particle forms a core of the nanostructure and calcium silicate forms a shell of the nanostructure; the nanostructure has particle size in a range of 50 to 500 nm; surface area in a range of 0.01 μm^2 to 100 μm^2; and pore size in a range of 2 nm to 20 nm.

8. The nanocomposite as claimed in claim 7, wherein the additive is embedded with calcium silicate in the shell of the nanostructure.
9. The nanocomposite as claimed in claim 7, wherein calcium oxide is embedded with calcium silicate in the shell of the nanostructure.
10. A process for preparing the nanostructure as claimed in claim 1, the process comprising:
    a. mixing an oxidizing agent, and a magnetic metal salt in a first solvent followed by addition of a base and a silicate precursor to obtain a first mixture;
    b. contacting a calcium salt with the first mixture in the presence of a second solvent to obtain a second mixture; and
    c. annealing the second mixture at a temperature in a range of 550 to 650 °C to obtain a glassy calcium silicate as the shell of the nanostructure, followed by filtration and drying to obtain the nanostructure,

    wherein the nanostructure has particle size in a range of 50 to 500 nm; surface area in a range of 0.01 μm^2 to 100 μm^2; and pore size in a range of 2 nm to 20 nm.
11. The process as claimed in claim 10, wherein the oxidizing agent is selected from sodium acetate, sodium citrate, or combinations thereof; the magnetic metal salt is selected from iron chloride, iron nitrate, nickel chloride, nickel nitrate, cobalt chloride, cobalt nitrate, or combinations thereof; the first solvent is selected from ethylene glycol, ethanol, water, hydrochloric acid, or combinations thereof; the base is selected from ammonium hydroxide, or metal hydroxide; and the silicate precursor is selected from tetraethyl orthosilicate

(TEOS), tetramethylorthosilicate (TMOS), polyethoxydisiloxane (PEDS), methyltriethoxysilane (MTES) or combinations thereof.

12. The process as claimed in claim 10, wherein the calcium salt is selected from calcium nitrate, calcium carbonate, calcium phosphate, calcium chloride, or combinations thereof; and the second solvent is selected from ethanol, water, or combinations thereof.

13. The process as claimed in claim 10, wherein annealing is carried out for a time period in a range of 2 to 15 hours.

14. The process as claimed in claim 10, wherein mixing the oxidizing agent, the magnetic metal salt in the first solvent is followed by heating at a temperature in a range of 200 to 250 ℃ for a time period of 8 to 12 hours, prior to addition of the base and the silicate precursor.

15. A process of preparing the nanocomposite as claimed in claim 7, the process comprising: a) preparing the nanostructure as claimed in claim 10; and b) immersing the nanostructure in a solution comprising a compound selected from calcium oxide, strontium salt, calcium fluoride, sodium fluoride, phosphates, or combinations thereof, at a temperature in a range of 20 to 80℃ to obtain the nanocomposite.

16. A gel comprising:
    a. 0.1 to 10 % (w/w) of the nanostructure as claimed in claim 1 or the nanocomposite as claimed in claim 7;
    b. 0.1 to 20% (w/w) of a hydrogel base;
    c. 0.1 to 1% (w/w) of a pH modifier;
    d. 5 to 10% (w/w) of a humectant;
    e. 80 to 99% (w/w) of a swelling agent;
    f. 0.1% to 15% (w/w) of calcium oxide; and
    g. optionally 1 to 5% (w/w) of a stabilizer.

17. The gel as claimed in claim 16 further comprises an antibacterial agent.

18. The gel as claimed in claim 16, wherein the hydrogel base is selected from polyacrylic acid, diutan gum, alkyl acrylate cross polymer, poloxamers compounds, or combinations thereof; the pH modifier is selected from triethanolamine, di-sodium tetraborate, TrisBase, or combinations thereof; the humectant is selected from glycerin, lecithin, propylene glycol, or combinations thereof; the swelling agent is selected from ethanol, water, or combinations thereof; and the stabilizer is selected from xanthan gum, gelatin, starch, agar glycerides, or combinations thereof.

19. The gel as claimed in claim 16, wherein the gel has viscosity in a range of 1 to 10^5 cP; and storage modulus in a range of 1 to 1000 Pa.

20. A process for preparing the gel as claimed in claim 16, the process comprising:
    a. mixing the nanostructure as claimed in claim 1 or the nanocomposite as claimed in claim 7, with a hydrogel base and a swelling agent to obtain a first solution;
    b. adding a pH modifier and calcium oxide powder to the first solution to obtain a second solution; and
    c. adding a humectant and optionally a stabilizer, to obtain the gel.

21. Use of a nanostructure as claimed in claim 1 or the nanocomposite as claimed in claim 7 or the gel as claimed in claim 16 in the manufacture of a medicament for treating dental hypersensitivity.

22. Use of a nanostructure as claimed in claim 1 or the nanocomposite as claimed in claim 7 or the gel as claimed in claim 16, the use comprising the nanostructure as claimed in claim 1 or the nanocomposite as claimed in claim 7 or the gel as claimed in claim 16 in the manufacture of a medicament to be applied, driven, and positioned to an infected dentinal tubule using a magnetic cap.

23. A device comprising the nanostructure as claimed in claim 1 or the nanocomposite as claimed in claim 7 or the gel as claimed in claim 16 and a magnetic cap.
24. The device as claimed in claim 23, wherein the device further comprises a piezo generator to induce acoustic excitation.
25. The use as claimed in claim 22 or the device as claimed in claim 23, wherein the magnetic cap comprises a simple permanent magnet or an electromagnetic coil.
26. Use of the nanostructure as claimed in claim 1 or the nanocomposite as claimed in claim 7 or the gel as claimed in claim 16.
27. A nanostructure as claimed in claim 1 or the nanocomposite as claimed in claim 7 or the gel as claimed in claim 16 for use in therapy.