CLAIMS

1. A method of synthesizing a layered double hydroxide, the method comprising forming the layered double hydroxide in presence of a steric repulsion agent, wherein forming the layered double hydroxide in presence of the steric repulsion agent comprises
    a. providing a first solution comprising the steric repulsion agent,
    b. dissolving at least one metal salt in the first solution comprising the steric repulsion agent to form a second solution,
    c. adding a precipitating agent to the second solution to form a third solution, and
    d. heating the third solution to obtain the layered double hydroxide,

    wherein size of the layered double hydroxide formed is controlled by varying amount of steric repulsion agent present in the first solution.

2. The method according to claim 1, wherein the steric repulsion agent comprises or consists of one or more biomacromolecules.

3. The method according to claim 1 or 2, wherein the steric repulsion agent is a hydrogel comprising biomacromolecules.

4. The method according to claim 2 or 3, wherein the one or more biomacromolecules is selected from the group consisting of protein, polysaccharide, and combinations thereof.

5. The method according to claim 4, wherein the protein is selected from the group consisting of gelatin, collagen, albumin, casein, lactoglobulin, and combinations thereof.

6. The method according to claim 4 or 5, wherein the polysaccharide is selected from the group consisting of agarose, alginate, chitosan, dextran, soluble starch, gellan gum, and combinations thereof.

7. The method according to any one of claims 1 to 6, wherein the steric repulsion agent comprises gelatin, agarose, or combinations thereof.

8. The method according to any one of claims 1 to 7, wherein providing a first solution comprising the steric repulsion agent comprises at least substantially dissolving the steric repulsion agent in a liquid reagent.

9. The method according to claim 8, wherein the liquid reagent is an aqueous solution.

10. The method according to any one of claims 1 to 9, wherein concentration of the steric repulsion agent in the first solution is in the range of about 0.1 wt% to about 1 wt%.

11. The method according to any one of claims 1 to 10, wherein the at least one metal salt is selected from the group consisting of a metal nitrate, a metal halide, a metal sulfate, and a metal acetate.

12. The method according to any one of claims 1 to 11, wherein the at least one metal salt is a salt of a metal selected from the group consisting of magnesium, cobalt, nickel, copper, zinc, manganese, iron, calcium, and combinations thereof.

13. The method according to any one of claims 1 to 12, wherein the at least one metal salt is a combination of two metal salts selected from the group consisting of a magnesium salt and a cobalt salt, a nickel salt and a cobalt salt, a copper salt and a cobalt salt, a zinc salt and a cobalt salt, a nickel salt and a manganese salt, and a nickel salt and an iron salt.

14. The method according to any one of claims 1 to 13, wherein concentration of metal ions in the second solution is in the range of about 30 mM to about 60 mM.

15. The method according to any one of claims 1 to 14, wherein the at least one metal salt in the second solution comprises or consists of nickel nitrate and cobalt nitrate.

16. The method according to claim 15, wherein ratio of nickel nitrate to cobalt nitrate is about 1:1.

17. The method according to any one of claims 1 to 16, wherein the precipitating agent is selected from the group consisting of hexamethylenetetramine, urea, thiourea, and combinations thereof.

18. The method according to any one of claims 1 to 17, wherein concentration of the precipitating agent in the third solution is in the range of about 0.1 M to about 0.5 M.

19. The method according to any one of claims 1 to 18, wherein heating the third solution is carried out at a temperature in the range of about 80 °C to about 120 °C.

20. The method according to any one of claims 1 to 19, wherein heating the third solution is carried out in an autoclave.

21. The method according to any one of claims 1 to 20, wherein heating the third solution is carried out for a time period in the range of about 5 hours to about 14 hours.

22. The method according to any one of claims 1 to 21, wherein heating the third solution comprises adding a second metal salt to the third solution.

23. The method according to claim 22, wherein the second metal salt comprises a metal different from the metal in the at least one metal salt in the second solution.

24. The method according to claim 22 or 23, wherein the at least one metal salt in the second solution is cobalt nitrate, and the second metal salt is zinc nitrate or copper nitrate.

25. The method according to any one of claims 22 to 24, wherein concentration of the second metal salt in the third solution is in the range of about 5 mM to about 15 mM.

26. The method according to any one of claims 1 to 25, further comprising centrifuging the third solution after heating.

27. The method according to claim 26, further comprising drying the layered double hydroxide at a temperature in the range of about 50 °C to about 70 °C.

28. The method according to claim 27, wherein drying the layered double hydroxide is carried out for a time period of at least 6 hours.

29. The method according to any one of claims 1 to 28, wherein the layered double hydroxide is a nanosized layered double hydroxide.

30. The method according to any one of claims 1 to 29, wherein the layered double hydroxide has a maximal dimension of about 300 nm.

31. The method according to any one of claims 1 to 30, wherein the layered double hydroxide has a maximal dimension of about 200 nm.