CLAIMS:

1. Silica nanoparticles having a diameter of about 50 nm to about 1000 nm and a particle density of about 1.96 g/cm$^3$ or less.

2. The silica nanoparticles of claim 1 having a rate of dissolution in 1N KOH solution of more than 10 nm/min, wherein the rate is measured by mixing 1-5 mg/mL silica nanoparticles in 1N aqueous KOH solution at 25°C and measuring the change in diameter as a function of time by the Dynamic Light Scattering method or measuring the turbidity decay as a function of time using a nephelometric turbidity meter.

3. The silica nanoparticles of claim 1 or 2, having a particle density of about 1.93 to about 1.96 g/cm$^3$.

4. The silica nanoparticles of any one of claims 1 to 3, having a particle size of from about 160 nm to about 630 nm.

5. The silica nanoparticles of any one of claims 1 to 4, which are generally spherical.

6. The silica nanoparticles of any one of claims 1 to 5, having a rate of dissolution of about 30 nm/min or higher.

7. The silica nanoparticles of any one of claims 1 to 6, having a rate of dissolution of about 30 nm/min to about 300 nm/min.

8. A method of preparing silica nanoparticles having a diameter of about 50 nm to about 1000 nm and a particle density of about 1.96 g/cm$^3$ or less, said method comprising:

(a) reacting an orthosilicate and an alcohol or a mixture of alcohols in an aqueous medium in the presence of a salt of a metal of Group Ia or Group IIa or in the presence of a metalloid compound, optionally in combination with ammonium hydroxide,

(b) isolating the resulting nanoparticles, and

(c) treating the nanoparticles from (b) with an acid.

9. The method of claim 8, wherein the orthosilicate is a tetraalkylorthosilicate.

10. The method of claim 8 or 9, wherein the orthosilicate is selected from tetramethylorthosilicate, tetraethylorthosilicate, tetrapropylorthosilicate, tetrabutylorthosilicate, and tetrapentylorthosilicate.

11. The method of any one of claims 8 to 10, wherein the alcohol or mixture of alcohols is selected from methanol, ethanol, propanol, butanol, and mixtures thereof.

12. The method of any one of claims 8 to 11, wherein the salt of the metal is selected from salts of lithium, sodium, potassium, cesium, magnesium, and calcium.

13. The method of any one of claims 8 to 12, wherein the salt of the metal is selected from lithium acetate, sodium acetate, sodium metasilicate, sodium formate, potassium acetate, cesium acetate, magnesium acetate, and calcium acetate.

14. The method of any one of claims 8 to 12, wherein the metalloid compound is a compound of boron.

15. The method of claim 14, wherein the compound of boron is boric acid or an alkyl borate.

16. The method of claim 15, wherein the alkyl borate is trimethyl borate or triethyl borate.

17. The method of any one of claims 8 to 16, wherein (a) is performed by mixing water, alcohol, the orthosilicate, and the salt of the metal or the metalloid compound.

18. The method of claim 17, comprising mixing about 2 to 25 mol/L of water, about 8 to about 16 mol/L of ethanol, about 0 to about 2 mol/L of methanol, about 0.1 to about 2 mol/L of ammonia, about 0.1 to about 0.4 mol/L of tetraalkylorthosilicate, and about 0.001 to about 0.01 mol/L of a salt of the metal or metalloid compound.

19. The method of any one of claims 8 to 16, wherein (a) is performed by adding an orthosilicate into a solution comprising the salt of the metal or the metalloid compound, water, and alcohol.

20. The method of claim 19, comprising adding about 0.1 to about 0.4 mol/L of tetraalkylorthosilicate into a solution including about 2 to 25 mol/L of water, about 8 to about 16 mol/L of ethanol, about 0 to about 2 mol/L of methanol, about 0.1 to about 2 mol/L of

ammonia, and about 0.001 to about 0.01 mol/L of a salt of a metal or metalloid compound and mixing the resulting mixture.

21. The method of any one of claims 8 to 20, wherein the mixing is carried out for a period of from about 5 minutes to about 2 hours.

22. The method of claim 21, wherein the mixing is carried out at a temperature of from about 20 °C to about 50 °C.

23. The method of any one of claims 8 to 22, wherein the resulting nanoparticles are isolated by centrifugal separation followed by washing with an alcohol.

24. The method of any one of claims 8 to 23, wherein the acid is a mineral acid or organic acid.

25. The method of claim 24, wherein the mineral acid is hydrochloric acid and the organic acid is formic acid.

26. The nanoparticles prepared by the method of any one of claims 8 to 25.

**CLAIMS**

1. Silica nanoparticles having a diameter of about 50 nm to about 1000 nm and a particle density of about 1.96 g/cm$^3$ or less, and a rate of dissolution in 1N KOH solution of more than 10 nm/min, wherein the rate is measured by mixing 1-5 mg/mL silica nanoparticles in 1N aqueous KOH solution at 25°C and measuring the change in diameter as a function of time by the Dynamic Light Scattering method or measuring the turbidity decay as a function of time using a nephelometric turbidity meter.

2. The silica nanoparticles of claim 1, having a particle density of about 1.93 to about 1.96 g/cm$^3$.

3. The silica nanoparticles of claim 1 or 2, having a particle size of from about 160 nm to about 630 nm.

4. The silica nanoparticles of any one of claims 1 to 3, which are generally spherical.

5. The silica nanoparticles of any one of claims 1 to 4, having a rate of dissolution of about 30 nm/min or higher.

6. The silica nanoparticles of any one of claims 1 to 5, having a rate of dissolution of about 30 nm/min to about 300 nm/min.

7. A method of preparing silica nanoparticles having a diameter of about 50 nm to about 1000 nm and a particle density of about 1.96 g/cm$^3$ or less, and a rate of dissolution in 1N KOH solution of more than 10 nm/min, wherein the rate is measured by mixing 1-5 mg/mL silica nanoparticles in 1N aqueous KOH solution at 25°C and measuring the change in diameter as a function of time by the Dynamic Light Scattering method or measuring the turbidity decay as a function of time using a nephelometric turbidity meter, said method comprising:

(a) reacting an orthosilicate and an alcohol or a mixture of alcohols in an aqueous medium in the presence of a salt of a metal of Group Ia or Group IIa or in the presence of a metalloid compound, optionally in combination with ammonium hydroxide,

(b) isolating the resulting nanoparticles, and

(c) treating the nanoparticles from (b) with an acid.

8. The method of claim 7, wherein the orthosilicate is a tetraalkylorthosilicate.

9. The method of claim 7 or 8, wherein the orthosilicate is selected from tetramethylorthosilicate, tetraethylorthosilicate, tetrapropylorthosilicate, tetrabutylorthosilicate, and tetrapentylorthosilicate.

10. The method of any one of claims 7 to 9, wherein the alcohol or mixture of alcohols is selected from methanol, ethanol, propanol, butanol, and mixtures thereof.

11. The method of any one of claims 7 to 10, wherein the salt of the metal is selected from salts of lithium, sodium, potassium, cesium, magnesium, and calcium.

12. The method of any one of claims 7 to 11, wherein the salt of the metal is selected from lithium acetate, sodium acetate, sodium metasilicate, sodium formate, potassium acetate, cesium acetate, magnesium acetate, and calcium acetate.

13. The method of any one of claims 7 to 11, wherein the metalloid compound is a compound of boron.

14. The method of claim 13, wherein the compound of boron is boric acid or an alkyl borate.

15. The method of claim 14, wherein the alkyl borate is trimethyl borate or triethyl borate.

16. The method of any one of claims 7 to 15, wherein (a) is performed by mixing water, alcohol, the orthosilicate, and the salt of the metal or the metalloid compound.

17. The method of claim 16, comprising mixing about 2 to 25 mol/L of water, about 8 to about 16 mol/L of ethanol, about 0 to about 2 mol/L of methanol, about 0.1 to about 2 mol/L of ammonia, about 0.1 to about 0.4 mol/L of tetraalkylorthosilicate, and about 0.001 to about 0.01 mol/L of a salt of the metal or metalloid compound.

18. The method of any one of claims 7 to 15, wherein (a) is performed by adding an orthosilicate into a solution comprising the salt of the metal or the metalloid compound, water, and alcohol.

19. The method of claim 18, comprising adding about 0.1 to about 0.4 mol/L of tetraalkylorthosilicate into a solution including about 2 to 25 mol/L of water, about 8 to about 16 mol/L of ethanol, about 0 to about 2 mol/L of methanol, about 0.1 to about 2 mol/L of ammonia, and about 0.001 to about 0.01 mol/L of a salt of a metal or metalloid compound and mixing the resulting mixture.

20. The method of any one of claims 7 to 19, wherein the mixing is carried out for a period of from about 5 minutes to about 2 hours.

21. The method of claim 20, wherein the mixing is carried out at a temperature of from about 20 °C to about 50 °C.

22. The method of any one of claims 7 to 21, wherein the resulting nanoparticles are isolated by centrifugal separation followed by washing with an alcohol.

23. The method of any one of claims 7 to 22, wherein the acid is a mineral acid or organic acid.

24. The method of claim 23, wherein the mineral acid is hydrochloric acid and the organic acid is formic acid.

25. The nanoparticles prepared by the method of any one of claims 7 to 24.