WHAT IS CLAIMED IS:

1. A process of preparing nanostructured lithium titanate particles, the process comprising:

providing a solvent containing a soft-template compound, a lithium ion-containing compound, and a titanium ion-containing compound;

removing the solvent to obtain a lithium titanate precursor; and

calcining the lithium titanate precursor to obtain crystalline lithium titanate particles,

wherein the solvent is a mixture of ethanol and water, the lithium ion-containing compound and the titanium ion-containing compound are in a stoichiometric proportion, and the weight ratio of the soft-template compound to the lithium ion-containing compound is 1:2 to 3:2.

2. The process of claim 1, further comprising, after the calcining step, ball milling the crystalline lithium titanate particles at 200 to 600 rpm for 1 to 5 hours to yield milled lithium titanate particles.

3. The process of claim 2, wherein the crystalline lithium titanate particles are ball milled at 300 to 400 rpm for 3 to 4 hours.

4. The process of claim 2, further comprising annealing the milled lithium titanate particles at 400 to 750°C for 1 to 5 hours to yield nanostructured lithium titanate particles.

5. The process of claim 4, wherein the milled lithium titanate particles are annealed at 500 to 700°C for 1 to 2 hours.

6. The process of claim 1, wherein the lithium titanate precursor is calcined at 600 to 800°C for 2 to 8 hours.

7. The process of claim 6, wherein the lithium titanate precursor is calcined at 600 to 750°C for 4 to 6 hours.

8. The process of claim 1, wherein the soft-template compound is dodecyltrimethyl-ammonium bromide, cetyltrimethylammonium bromide, octadecyltrimethylammonium bromide, tetradecyltrimethylammonium bromide, decyltrimethylammonium bromide, or octyltrimethyl-ammonium bromide; ~~or pluronic F-127;~~ and the solvent is a mixture of ethanol and water, in which the weight ratio of ethanol to water is 1:1 to 6:1.

9. The process of claim 8, wherein the lithium ion-containing compound is lithium acetate, lithium chloride, lithium hydroxide, or lithium carbonate, and the titanium ion-containing compound is titanium isopropoxide.

10. The process of claim 9, further comprising, after the calcining step, ball milling the crystalline lithium titanate particles at 200 to 600 rpm for 1 to 5 hours to yield milled lithium titanate particles and annealing the milled lithium titanate particles at 400 to 750°C for 1 to 5 hours to yield nanostructured lithium titanate particles, wherein the lithium titanate precursor is calcined at 600 to 800°C for 2 to 8 hours.

11. The process of claim 10, wherein the lithium titanate precursor is calcined at 600 to 750°C for 4 to 6 hours, the crystalline lithium titanate particles are ball milled at 300 to 400 rpm for 3 to 4 hours, and the milled lithium titanate particles are annealed at 500 to 700°C for 1 to 2 hours.

12. The process of claim 9, wherein the lithium ion-containing compound is lithium acetate or lithium chloride and the titanium ion-containing compound is titanium isopropoxide.

13. The process of claim 12, further comprising, after the calcining step, ball milling the crystalline lithium titanate particles at 200 to 600 rpm for 1 to 5 hours to yield milled lithium titanate particles and annealing the milled lithium titanate particles at 400 to 750°C for 1 to 5 hours to yield nanostructured lithium titanate particles, wherein the lithium titanate precursor is calcined at 600 to 800°C for 2 to 8 hours.

14. The process of claim 13, wherein the lithium titanate precursor is calcined at 600 to 750°C for 4 to 6 hours, the crystalline lithium titanate particles are ball milled at 300 to 400 rpm for 3 to 4 hours, and the milled lithium titanate particles are annealed at 500 to700°C for 1 to 2 hours.

15. The process of claim 8, wherein the soft-template compound is cetyl trimethylammonium bromide, dodecyl trimethylammonium bromide, or octyl trimethylammonium bromide; and the solvent is a mixture of ethanol and water, in which the weight ratio of ethanol to water is 1:1 to 3:1.

16. The process of claim 15, wherein the lithium ion-containing compound is lithium acetate, lithium chloride, lithium hydroxide or lithium carbonate; and the titanium ion-containing compound is titanium isopropoxide.

17. The process of claim 16, further comprising, after the calcining step, ball milling the crystalline lithium titanate particles at 200 to 600 rpm for 1 to 5 hours to yield milled lithium titanate particles and annealing the milled lithium titanate particles at 400 to 750°C for 1 to 5 hours to yield nanostructured lithium titanate particles, wherein the lithium titanate precursor is calcined at 600 to 800°C for 2 to 8 hours.

18. The process of claim 17, wherein the lithium titanate precursor is calcined at 600 to 750°C for 4 to 6 hours, the crystalline lithium titanate particles are ball milled at 300 to 400 rpm for 3 to 4 hours, and the milled lithium titanate particles are annealed at 500 to 700°C for 1 to 2 hours.

19. The process of claim 16, wherein the lithium ion-containing compound is lithium acetate or lithium chloride and the titanium ion-containing compound is titanium isopropoxide.

20. The process of claim 19, further comprising, after the calcining step, ball milling the crystalline lithium titanate particles at 200 to 600 rpm for 1 to 5 hours to yield milled lithium titanate particles and annealing the milled lithium titanate

particles at 400 to 750°C for 1 to 5 hours to yield nanostructured lithium titanate particles, wherein the lithium titanate precursor is calcined at 600 to 800°C for 2 to 8 hours.

~~21. The process of claim 20, wherein the lithium titanate precursor is calcined at 600 to 750°C for 4 to 6 hours, the crystalline lithium titanate particles are ball milled at 300 to 400 rpm for 3 to 4 hours, and the milled lithium titanate particles are annealed at 500 to 700°C for 1 to 2 hours.~~

~~22. The process of claim 1, wherein the lithium ion-containing compound is lithium acetate, lithium chloride, lithium hydroxide, or lithium carbonate, and the titanium ion-containing compound is titanium isopropoxide.~~

~~23. The process of claim 22, further comprising, after the calcining step, ball milling the crystalline lithium titanate particles at 200 to 600 rpm for 1 to 5 hours to yield milled lithium titanate particles and annealing the milled lithium titanate particles at 400 to 750°C for 1 to 5 hours to yield nanostructured lithium titanate particles, wherein the lithium titanate precursor is calcined at 600 to 800°C for 2 to 8 hours.~~

~~24. The process of claim 23, wherein the lithium titanate precursor is calcined at 600 to 750°C for 4 to 6 hours, the crystalline lithium titanate particles are ball milled at 300 to 400 rpm for 3 to 4 hours, and the milled lithium titanate particles are annealed at 500 to 700°C for 1 to 2 hours.~~

~~25. The process of claim 22, the process of claim 16, wherein the lithium ion-containing compound is lithium acetate or lithium chloride and the titanium ion-containing compound is titanium isopropoxide.~~

~~26. The process of claim 25, further comprising, after the calcining step, ball milling the crystalline lithium titanate particles at 200 to 600 rpm for 1 to 5 hours to yield milled lithium titanate particles and annealing the milled lithium titanate particles at 400 to 750°C for 1 to 5 hours to yield nanostructured lithium titanate~~

~~particles, wherein the lithium titanate precursor is calcined at 600 to 800°C for 2 to 8 hours.~~

~~27. The process of claim 26, wherein the lithium titanate precursor is calcined at 600 to 750°C for 4 to 6 hours, the crystalline lithium titanate particles are ball milled at 300 to 400 rpm for 3 to 4 hours, and the milled lithium titanate particles are annealed at 500 to 700°C for 1 to 2 hours.~~

~~28.~~21. A nanostructured lithium titanate particle prepared by the process of claim 1~~.~~, the nanostructured lithium titanate particle having a particle size of 30 to 500 nm and a pore size of 3 to 10 nm.

~~29.~~22. A nanostructured lithium titanate particle comprising spinel $Li_4Ti_5O_{12}$ crystals, wherein the particle has a particle size of 30 to 500 nm and a pore size of 3 to 10 nm.