CLAIMS

What is claimed is:

1. An electrode assembly for a nonaqueous electrolyte secondary battery, comprising at least one anode, at least one cathode and at least one separator interposed between the at least one anode and at least one cathode, wherein the water content of the electrode assembly is less than 20 ppm by weight, based on the total weight of the electrode assembly.

2. The electrode assembly of claim 1, wherein the at least one cathode comprises a cathode current collector and a cathode electrode layer comprising a cathode material, a binder material and a conductive agent, wherein the at least one anode comprises an anode current collector and an anode electrode layer comprising an anode material, a binder material and a conductive agent, and wherein each of the cathode and anode electrode layers independently has a void volume of less than 40%, less than 35%, less than 33%, less than 30%, less than 25%, less than 20%, or less than 15%, based on the total volume of the electrode layer.

3. The electrode assembly of claim 2, wherein the density of each of the cathode and anode electrode layers is independently from about 1.0 g/m^3 to about 6.5 g/m^3.

4. The electrode assembly of claim 2, wherein the density of each of the cathode and anode electrode layers is independently from about 1.0 g/m^3 to about 3.0 g/m^3.

5. The electrode assembly of claim 2, wherein the thickness of each of the cathode and anode electrode layers is independently from about 1.0 μm to about 40 μm.

6. The electrode assembly of claim 2, wherein the thickness of each of the cathode and anode electrode layers is independently from about 1.0 μm to about 25 μm.

7. The electrode assembly of claim 1, wherein the at least one separator is made of polymeric fibers selected from the group consisting of polyolefin, polyethylene, high-density polyethylene, linear low-density polyethylene, low-density polyethylene, ultrahigh-molecular-weight polyethylene, polypropylene, polypropylene/polyethylene co-polymer, polybutylene, polypentene, polyacetal, polyamide, polycarbonate, polyimide, polyetherether ketone, polysulfones, polyphenylene oxide, polyphenylene sulfide, polyacrylonitrile,

polyvinylidene fluoride, polyoxymethylene, polyvinyl pyrrolidone, polyester, polyethylene terephthalate, polybutylene terephthalate, polyethylene naphthalene, polybutylene naphthalate, and combinations thereof.

8. The electrode assembly of claim 1, wherein the thickness of the separator is from about 1.0 μm to about 40 μm.

9. The electrode assembly of claim 1, wherein the thickness of the separator is from about 1.0 μm to about 25 μm.

10. The electrode assembly of claim 2, wherein each of the binder materials in the cathode and anode electrode layers is independently selected from the group consisting of styrene-butadiene rubber, acrylated styrene-butadiene rubber, acrylonitrile copolymer, acrylonitrile-butadiene rubber, nitrile butadiene rubber, acrylonitrile-styrene-butadiene copolymer, acryl rubber, butyl rubber, fluorine rubber, polytetrafluoroethylene, polyethylene, polypropylene, ethylene/propylene copolymers, polybutadiene, polyethylene oxide, chlorosulfonated polyethylene, polyvinylpyrrolidone, polyvinylpyridine, polyvinyl alcohol, polyvinyl acetate, polyepichlorohydrin, polyphosphazene, polyacrylonitrile, polystyrene, latex, acrylic resins, phenolic resins, epoxy resins, carboxymethyl cellulose, hydroxypropyl cellulose, cellulose acetate, cellulose acetate butyrate, cellulose acetate propionate, cyanoethylcellulose, cyanoethylsucrose, polyester, polyamide, polyether, polyimide, polycarboxylate, polycarboxylic acid, polyacrylic acid, polyacrylate, polymethacrylic acid, polymethacrylate, polyacrylamide, polyurethane, fluorinated polymer, chlorinated polymer, a salt of alginic acid, polyvinylidene fluoride, poly(vinylidene fluoride)-hexafluoropropene, and combinations thereof.

11. The electrode assembly of claim 2, wherein each of the binder materials in the cathode and anode electrode layers is independently present in an amount from 2% to 10% by weight, based on the total weight of the electrode layer.

12. The electrode assembly of claim 2, wherein the cathode material is selected from the group consisting of $LiCoO_2$, $LiNiO_2$, $LiNi_xMn_yO_2$, $Li_{1+z}Ni_xMn_yCo_{1-x-y}O_2$, $LiNi_xCo_yAl_zO_2$, LiV_2O_5, $LiTiS_2$, $LiMoS_2$, $LiMnO_2$, $LiCrO_2$, $LiMn_2O_4$, $LiFeO_2$, $LiFePO_4$, $LiNi_{0.5}Mn_{1.5}O_4$, $LiNi_{0.4}Mn_{1.6}O_4$, and combinations thereof, wherein each x is independently from 0.3 to 0.8; each y is independently from 0.1 to 0.45; and each z is independently from 0 to 0.2.

13. The electrode assembly of claim 2, wherein each of the conductive agents in the cathode and anode electrode layers is independently selected from the group consisting of carbon, carbon black, graphite, expanded graphite, graphene, graphene nanoplatelets, carbon fibres, carbon nano-fibers, graphitized carbon flake, carbon tubes, carbon nanotubes, activated carbon, mesoporous carbon, and combinations thereof.

14. The electrode assembly of claim 2, wherein each of the conductive agents in the cathode and anode electrode layers is independently present in an amount from 2% to 10% by weight, based on the total weight of the electrode layer.

15. The electrode assembly of claim 2, wherein the anode material is selected from the group consisting of natural graphite particulate, synthetic graphite particulate, Sn particulate, $Li_4Ti_5O_{12}$ particulate, Si particulate, Si-C composite particulate, and combinations thereof.

16. The electrode assembly of claim 2, wherein each of the current collectors of the at least one cathode and anode is independently stainless steel, titanium, nickel, aluminum, copper, or electrically-conductive resin.

17. The electrode assembly of claim 2, wherein the current collector of the at least one cathode is an aluminum thin film, and wherein the current collector of the at least one anode is a copper thin film.

18. The electrode assembly of claim 1, wherein the at least one anode and at least one cathode in the electrode assembly have a water content of less than 20 ppm by weight, based on the total weight of the at least one anode and at least one cathode.

19. The electrode assembly of claim 1, wherein the at least one separator in the electrode assembly has a water content of less than 20 ppm by weight, based on the total weight of the at least one separator.

20. A lithium battery comprising the electrode assembly of claim 1.