Claims

1. A dry process for forming a prelithiated anode ~~electrode~~ comprising:

a) preparing a dry anode material mixture comprising an active component comprising an active anode material, a binder and a conductive material mixed with a prelithiation agent comprising either a printable lithium composition comprising either a lithium metal powder, a polymer binder compatible with the lithium metal powder, and a rheology modifier compatible with the lithium metal powder or a non-pyrophoric stabilized lithium metal powder to form the dry anode material mixture;

b) applying an adhesion promoting agent to a current collector; and

c) depositing the dry anode material mixture on the current collector having the adhesion promoting agent thereon as a non self-supported layer or interface to form ~~a~~ the prelithiated anode.

2. The process of Claim 1, wherein depositing the dry anode material mixture to the substrate is performed by a method selected from the group consisting of extruding, roll compaction, electrostatic deposition and combinations thereof.

3. The process of Claim 1, wherein the adhesion promoting agent is selected from the group consisting of unsaturated elastomers, saturated elastomers, thermoplastics, polyacrylic acid, polyvinylidene chloride, and polyvinyl acetate. poly(ethylene oxide), polystyrene, polyisobutylene, natural rubbers, butadiene rubbers, styrene-butadiene rubber, polyisoprene rubbers, butyl rubbers, hydrogenated nitrile butadiene rubbers, epichlorohydrin rubbers, acrylate rubbers, silicon rubbers, nitrile rubbers, polyacrylic acid, polyvinylidene chloride, polyvinyl acetate, ethylene propylene diene termonomer, ethylene vinyl acetate copolymer, ethylene-propylene copolymers, ethylene-propylene terpolymers, polybutenes, wax and combinations thereof.

4. The process of Claim 1, wherein applying the dry anode material

mixture to the substrate comprises pressing the dry anode material mixture onto the substrate at a temperature between 80 and 180 °C and at a pressure between 5000 and 50000 PSI.

5. The process of Claim 1, wherein the binder is polyisobutylene or polyvinylidene fluoride, and the conductive material is carbon black.

6. The process of Claim 5, wherein the active anode material comprises a graphite or graphite/silicon oxide mixture.

7. The process of Claim 1, wherein the lithium metal powder is stabilized lithium metal powder and has a median particle size of less than 80 microns.

8. The process of Claim 1, wherein the rheology modifier is a conductive material.

9. The process of Claim 8, wherein the conductive material is selected from the group consisting of carbon black, carbon nanotubes, and graphene.

10. The process of Claim 1, wherein the rheology modifier provides improved capacity and is selected from the group consisting of silicon nanotubes, graphite, hard carbon, and graphene.

11. The process of Claim 1, wherein the rheology modifier is selected from the group consisting of carbonaceous materials, silicon-containing materials, tin-containing materials, Group IIA oxides, Group IIIA oxides, Group IVB oxides, Group VB oxides and Group VIA oxides.

12. The process of claim 1, which is a one-step process.

13. The process of claim 1, wherein the temperature of the process is below the melting point of lithium.

14. The process of Claim 1 further including forming a solid electrolyte interface layer within 24 hours after applying the dry anode material mixture on the current collector.