Claims

1. A substrate coated with a printable lithium composition, the printable lithium composition comprising:

a) between 5% to 50% by weight of lithium metal powder;

b) between 0.1% to 20% by weight of a polymer binder, wherein the polymer binder is compatible with the lithium metal powder;

c) between 0.1% to 30% of a carbon-based rheology modifier compatible with the lithium metal powder and the polymer binder, wherein the rheology modifier is dispersible within the composition and provides a three-dimensional structure for reducing the risk of dendrite growth during cycling when coated with the printable lithium composition; and

d) between 50% to 95% by weight of a non-polar solvent selected from the group consisting of acyclic hydrocarbons, cyclic hydrocarbons, aromatic hydrocarbons, symmetrical ethers, unsymmetrical ethers and cyclic ethers, and mixtures, blends or cosolvents thereof,

wherein the printable lithium composition has a zero shear viscosity of from 1×10^4 cps to 1×10^7 cps to maintain the lithium metal powder in suspension.

2. The substrate of Claim 1, wherein the substrate is an energy storage device substrate and is selected from the group consisting of a current collector, an anode, a cathode, an electrolyte and a separator.

3. The substrate of Claim 1, wherein the printable lithium composition is in the form of a foil or a film.

4. The substrate of Claim 1, wherein the polymer binder has a molecular weight of 1,000 to 8,000,000 and is selected from the group consisting of unsaturated elastomers, saturated elastomers, thermoplastics, polyacrylic acid, polyvinylidene chloride, and polyvinyl acetate.

5. The substrate of Claim 4, wherein the unsaturated elastomer is selected from the group consisting of butadiene rubber, isobutylene, and styrene butadiene rubber.

6. The substrate of Claim 4, wherein the saturated elastomer is selected from the group consisting of ethylene propylene diene monomer rubber and ethylene-vinyl acetate.

7. The substrate of Claim 4, wherein the thermoplastics is selected from the group consisting of polystyrene, polyethylene and polymers of ethylene oxide.

8. The substrate of Claim 1 further including one or more electrode active materials for forming an electrode.

9. A battery comprising a cathode, an electrolyte, and an anode, wherein the cathode, the electrolyte, the anode, or a combination thereof each may include a substrate coated with a printable lithium composition according to Claim 1.