Claims

1. A method for recycling cathode current collectors, the method comprising:
retracting a cell from a housing of a battery;
separating a cathode current collector from an anode current collector of the cell;
soaking the cathode current collector in a first solution for a predetermined time period to separate a graphite coating from a copper foil;
drying the copper foil; and
cleaning the copper foil to remove attachments from the copper foil,
wherein cleaning the copper foil comprises laser ablating the copper foil to remove the oxides, adhesive particles and carbon powders.

2. The method as recited in claim 1, wherein the first solution comprises a 3% to 8 %wt hydrochloric acid.

3. The method as recited in claim 2, wherein the predetermined time period is 2 minutes to 5 minutes.

4. The method as recited in claim 1, further comprising subjecting the first solution to a first ultrasonic oscillation during soaking the cathode current collector in the first solution to separate the graphite coating from the copper foil.

5. The method as recited in claim 4, wherein the first ultrasonic oscillation has a power of 600 watts to 1500 watts and a frequency of 30 KHz to 50KHz frequency.

6. The method as recited in claim 1 further comprising, after soaking the cathode current collector in the first solution and prior to drying the copper foil, cleaning the copper foil in a second solution to remove residues of the first solution.

7. The method as recited in claim 6, further comprising subjecting the second solution to a second ultrasonic oscillation during cleaning the copper foil to remove residues of the first solution.

8. Th method as recited in claim 7, wherein the second solution is water and the second ultrasonic oscillation has a power of 300 watts to 1500 watts and a frequency of 20 KHz to 35 KHz frequency.

9. The method as recited in claim 1, wherein drying the copper foil is implemented under a temperature not exceeding 60 degrees Celsius.

10. The method as recited in claim 1, wherein cleaning the copper foil to remove attachments from the copper foil comprises cleaning the copper foil to remove oxides, adhesive particles and carbon powders from the copper foil.

11. The method as recited in claim 1, wherein the laser ablating is implemented under a cleaning speed of 0.3 – 0.5 second per square centimeter on a surface of the copper foil.

12. The method as recited in claim 11, wherein the laser ablating forms a surface texture on the copper foil, wherein the surface texture comprises grooves and ridges with a pitch of 10 micrometers.

13. The method as recited in claim 1, wherein the laser ablating is implemented by a MOPA laser.