CLAIMS:

1. A process for delineating a population of electrode structures in a web, the web comprising an electrically conductive layer having opposing front and back surfaces and an electrochemically active material layer on the front surface, the back surface, or on both of the front and back surfaces, the web having a down-web direction and a cross-web direction, the down-web and cross-web directions being orthogonal to each other, the process comprising:

controlling a tension of the web in the down-web direction while forming a series of weakened tear patterns in the web in the down-web direction, the cross-web direction, or each of the cross-web and down-web directions that delineate members of the electrode structure population without releasing the delineated members from the web, wherein the delineated members are individually bounded, at least in part, by a member of the series of weakened tear patterns that is adapted to facilitate separation of the delineated members, individually, from the web by an application of a force, wherein controlling the tension of the web comprises maintaining a tension on the web of 500 gram force or less; and

forming a series of alignment features in the web that are disposed in the cross-web or down-web direction relative to the delineated members, the alignment features being adapted for locating delineated members of the electrode structure population, individually, in the web, wherein the series of alignment features are used to aid the formation of the series of weakened tear patterns.

2. The process of claim 1, wherein the series of weakened tear patterns, the series of alignment features, or the series of weakened tear patterns and the series of alignment features are formed with a laser.

3. The process of claim 1, wherein the controlling the tension of the web is performed using one or more rollers.

4. The process of claim 1, wherein the electrochemically active material layer is on only one of the front and back surfaces of the electrically conductive layer.

5. The process of claim 1, wherein the electrochemically active material layer is on both of the front and back surfaces of the electrically conductive layer.

6. The process of claim 1, wherein the delineated members of the electrode structure population have a length, $L_E$, a width $W_E$, and a height, $H_E$, wherein $W_E$ is measured in a direction that is orthogonal to the front and back surfaces of the web and to the down-web and cross-web directions and: (i) $L_E$ is measured in the cross-web direction and $H_E$ is measured in the down-web direction or (ii) $L_E$ is measured in the down-web direction and $H_E$ is measured in the cross-web direction and wherein a ratio of $L_E$ to each of $W_E$ and $H_E$ is at least 5:1 (that is, the ratio of $L_E$ to $W_E$ is at least 5:1, respectively, and the ratio of $L_E$ to $H_E$ is at least 5:1, respectively).

7. The process of claim 6, wherein a ratio of $H_E$ to $W_E$ is at least 0.4:1, respectively.

8. The process of claim 1, wherein the electrically conductive layer comprises a material suitable for use as a positive electrode current collector layer or a negative electrode current collector layer.

9. The process of claim 1, wherein the electroactive material layer comprises a cathodically active material.

10. The process of claim 1 wherein the electrochemically active material layer(s) comprise an anodically active material.

11. The process of claim 1 further comprising supporting a portion of the web on a support surface, the support surface defining an opening; wherein at least one of the forming the weakened tear patterns and the forming the series of alignment features is performed on the portion of the web located over the opening defined in the support surface.

12. The process of claim 11, wherein the at least one of the forming the weakened tear patterns and the forming the series of alignment features comprises forming a plurality of cuts and perforations through the web.

13. The process of claim 11, wherein the forming the weakened tear patterns and the forming the series of alignment features comprises laser machining and the machined web has a strength of 10% to 75% of a strength of an unmachined web in the down-web direction.

14. The process of claim 13, wherein the machined web has a strength of 5% to 30% of a strength of the unmachined web in the cross-web direction.

15. The process of claim 11, wherein the support surface comprises aluminum.

16. The process of claim 11, further comprising applying a vacuum to the web during the forming the weakened tear patterns and the forming the series of alignment features.

17. The process of claim 11, wherein the support surface comprises a plurality of openings, and the forming the weakened tear patterns and the forming the series of alignment features is performed on respective portions of the web located over different ones of the plurality of openings.

18. The process of claim 11, wherein the forming the weakened tear patterns and the forming the series of alignment features comprises laser machining and wherein the process further comprises applying a tension to the web in the cross-web direction prior to the laser machining.

19. The process of claim 18, wherein the laser machining comprises forming a series of outer perforations and a series of inner perforations, the outer perforations having a lower rupture strength than the inner perforations.

20. The process of claim 18, further comprising leaving an unmachined portion of the web between the alignment features and an outermost edge of the web in the cross-web direction.

21. The process of claim 18, further comprising contacting a rotating brush against the web after the laser machining.

22. The process of claim 1 further comprising controlling a portion of the web to be laser machined to be within about +/- 100 microns of a laser focal point of a laser beam, and laser machining the portion of the web in at least one of the cross-web direction and the down-web direction to form at least one of the weakened tear patterns and the series of alignment features.

23. The process of claim 22, wherein the controlling a portion of the web comprises controlling the web in a vertical axis direction substantially parallel to the laser beam.

24. The process of claim 22, wherein the laser machining is performed with a laser having a laser power within a range of from 10 watts to 5,000 watts, wherein the laser is a fiber laser, and wherein the laser is capable of laser pulse width types of one or more of continuous wave (cw), microsecond (μs), nanosecond (ns), picosecond (ps) and femtosecond (fs) pulse types or combinations thereof.

25. The process of claim 22, wherein the machined web has a strength of 10% to 75% of a strength of an unmachined web in the down-web direction.

26. The process of claim 22, wherein the laser machining is performed on a portion of the web located over an opening of a support surface.

27. The process of claim 26, wherein the support surface comprises aluminum and the support surface dissipates thermal energy from the laser machining process.

28. The process of claim 22, further comprising applying a tension to the web in the cross-web direction prior to the laser machining.

29. A process for delineating a population of electrode structures in a web, the web comprising an electrically conductive layer having opposing front and back surfaces and an electrochemically active material layer on the front surface, the back surface, or on both of the front and back surfaces, the web having a down-web direction and a cross-web direction, the down-web and cross-web directions being orthogonal to each other, the process comprising:

forming a series of alignment features in the web that are disposed in the down-web direction or the cross-web direction, wherein the series of alignment features establish locations on the web;

laser machining the web at the locations on the web established by the series of alignment features to form a series of weakened tear patterns in the web in the down-web direction, the cross-web direction, or each of the cross-web direction and

down-web direction that delineate members of the electrode structure population, wherein the delineated members are individually bounded, at least in part, by a member of the series of weakened tear patterns that is adapted to facilitate separation of delineated members, individually, from the web by an application of a force;

controlling a tension of the web in the down-web direction during the laser machining; and

conveying the web in the down-web direction or the cross-web direction after the laser machining without releasing the delineated members from the web.

30. The process of claim 29 further comprising tracking the alignment features with one or more visual inspection devices to measure at least one of a location and a speed of travel of the alignment features.

31. The process of claim 29 further comprising:

supporting a portion of the web on a support surface during the laser machining, wherein the series of weakened tear patterns are formed in the portion of the web supported on the support surface; and

dissipating thermal energy from the laser machining using the support surface.

32. The process of claim 29 further comprising laser ablating the web prior to the laser machining to form a series of ablations in the web that are disposed in the down-web direction or the cross-web direction, wherein each ablation is formed by removing a portion of the electrochemically active layer to thereby expose a portion of the electrically conductive layer.

33. The process of claim 29 further comprising forming a population of tie bars between at least some of the delineated members of the electrode structure population, each of the tie bars being sized to provide additional structural stiffness to the web.