WHAT IS CLAIMED IS:

1. An alkaline electrochemical cell, comprising:

a) a container; and

b) an electrode assembly disposed within the container and comprising a cathode, an anode, a separator located between the cathode and the anode, and an electrolyte shot solution;

wherein the anode comprises 1) solid zinc, 2) anolyte, 3) solid zinc oxide particles, solid zinc hydroxide particles, zinc oxide dissolved in said anolyte, or zinc hydroxide dissolved in said anolyte, and 4) a silicon donor;

wherein the silicon donor is present in an amount of at least 0.036 weight percent of the alkaline electrochemical cell's full cell electrolyte solution.

2. The alkaline electrochemical cell of claim 1, wherein the alkaline electrochemical cell comprises a total zinc oxide equivalent weight of about 0.5-3.0 weight percent.

3. The alkaline electrochemical cell of any of claims 1-2, wherein the anode comprises a gelled electrolyte, wherein the gelled electrolyte is prepared by combining a gelling agent with a first aqueous alkaline electrolyte solution, wherein the first aqueous alkaline electrolyte solution comprises an alkaline metal hydroxide electrolyte and dissolved zinc oxide.

4. The alkaline electrochemical cell of claim 1, wherein the anolyte comprises dissolved zinc oxide equivalent in an amount of 0.1-12 weight percent.

5. The alkaline electrochemical cell of claim 4, wherein the anolyte comprises dissolved zinc oxide equivalent in an amount of about 1.5-2.5 weight percent.

6. The alkaline electrochemical cell of claim 1, wherein the anolyte is at least 5% saturated with zinc oxide or zinc hydroxide.

7. The alkaline electrochemical cell of any one of claims 3-6, wherein the cathode comprises a catholyte, wherein the catholyte comprises an alkaline metal hydroxide electrolyte and dissolved zinc oxide.

8. The alkaline electrochemical cell of claim 7, wherein the catholyte comprises dissolved zinc oxide equivalent in an amount of 0.1-12 weight percent.

9. The alkaline electrochemical cell of claim 1 wherein the electrolyte shot solution comprises dissolved zinc oxide equivalent in an amount greater than 2.0 weight percent.

10. The alkaline electrochemical cell of claim 9, wherein the electrolyte shot solution comprises dissolved zinc oxide equivalent in an amount greater than 3.0 weight percent

11. The alkaline electrochemical cell of claim 1 wherein the electrolyte shot solution comprises an alkaline metal hydroxide and dissolved zinc oxide.

12. The alkaline electrochemical cell of claim 1 wherein the electrolyte shot solution comprises a silicon donor.

13. The alkaline electrochemical cell of claim 1 wherein the ratio of silicon donor to dissolved zinc oxide equivalent, by weight percent, is ≥0.016, ≥0.020, ≥0.025, ≥0.030, ≥0.035, ≥0.040, ≥0.045, ≥0.050, ≥0.055, ≥0.06, ≥0.065, ≥0.07, or ≥0.075.

14. The alkaline electrochemical cell of claim 1, wherein the absolute weight of silicon donor ranges from 0.002 to 1 gram in an LR6 cell.

15. The alkaline electrochemical cell of claim 1 wherein the solid zinc oxide particles have a Brunauer, Emmett and Teller (BET) surface area greater than 4 m^2/g; and

wherein the zinc oxide contains more than 0.1 weight percent of magnesium and/or sodium compounds.

16. The alkaline electrochemical cell of claim 1 wherein the separator is a bilayer separator comprising a high-density layer.

17. The alkaline electrochemical cell of claim 1 wherein the separator is a bilayer separator comprising a low-density layer.

18. The alkaline electrochemical cell of claim 16, wherein the bilayer separator is placed as a first or a second paper strip with the high-density layer facing the cathode.

19. The alkaline electrochemical cell of claim 16, wherein the mean pore size of the high-density layer is less than 1 microns.

20. The alkaline electrochemical cell of claim 1 wherein the surfactant concentration, relative to the anode active material, is between 5 and 50 ppm.

21. The alkaline electrochemical cell of claim 1, wherein the silicon donor is potassium silicate.

22. The alkaline electrochemical cell of claim 1, wherein the silicon donor is sodium silicate.

23. The alkaline electrochemical cell of claim 1, wherein the cathode comprises a silicon donor.

24. The alkaline electrochemical cell of claim 1, wherein the electrolyte solution further comprises silica.

25. The alkaline electrochemical cell of claim 1, wherein the full cell electrolyte concentration is about 15.0-40.0 weight percent.

26. The alkaline electrochemical cell of any one of claims 1-25, wherein the total dissolved zinc oxide equivalent weight percent in the electrochemical cell’s full cell electrolyte solution is at least about 0.5 weight percent.

27. The alkaline electrochemical cell of any one of claims 1-25, wherein the total dissolved zinc oxide equivalent weight percent in the electrochemical cell's full cell electrolyte solution is at least about 11 weight percent.

28. The alkaline electrochemical cell of any one of claims 1-25, wherein the electrochemical cell's full cell electrolyte is greater than 10% saturated with dissolved zinc oxide or zinc hydroxide.

29. The alkaline electrochemical cell of any one of claims 1-25, wherein the solid zinc oxide or solid zinc hydroxide is substituted and comprises a cation substituent or an anion substituent, wherein the substituted solid zinc oxide or substituted solid zinc hydroxide is less soluble than unsubstituted solid zinc oxide or unsubstituted solid zinc hydroxide.

30. The alkaline electrochemical cell of any one of claims 1-25, wherein the total cell saturation of zinc oxide or zinc hydroxide is at least about 40%.

31. The alkaline electrochemical cell of any one of claims 1-25, wherein the cell has a voltage of 0.1 V – 2.0 V, 0.2 V – 1.9 V, 0.3 V – 1.8 V, 0.4 V – 1.7 V, 0.5 V – 1.6 V, 0.6 V – 1.5 V, 0.7 V – 1.4 V, 0.8 V – 1.3 V, 0.9 V – 1.2 V, 1.0 V – 1.1 V, or is 0.1 V, 0.2 V, 0.3 V, 0.4 V, 0.5 V, 0.6 V, 0.7 V, 0.8 V, 0.9 V, 1.0 V, 1.1 V, 1.2 V, 1.3 V, 1.4 V, 1.5 V, 1.6 V, 1.7 V, 1.8 V, 1.9 V, or 2.0 V.

32. The alkaline electrochemical cell of any one of claims 1-31, wherein the full cell molarity of dissolved zinc oxide or zinc hydroxide is from about 0.1 to about 1.5.

33. The alkaline electrochemical cell of any one of claims 1-31, wherein the total cell zinc oxide equivalent weight is from about 0.05 to about 0.7 g.

34. The alkaline electrochemical cell of any one of claims 1-31, wherein the total number of Zn^{2+} moles in the cell is from about 0.00061 to about 0.00860.

35. The alkaline electrochemical cell of any one of claims 1-31, wherein

i) when charging the cell at 0.5 mA, at 21°C, the cell has a charging capacity to inflection of at least 25 mAh;
(ii) when charging the cell at 1 mA, at 21°C, the cell has a charging capacity to inflection of at least 22 mAh;
(iii) when charging the cell at 5 mA, at 21°C, the cell has a charging capacity to inflection of at least 17 mAh;
(iv) when charging the cell at 10 mA, at 21°C, the cell has a charging capacity to inflection of at least 14 mAh;
(v) when charging the cell at 50 mA, at 21°C, the cell has a charging capacity to inflection of at least 13 mAh; or
(vi) when charging the cell at 100 mA, at 21°C, the cell has a charging capacity to inflection of at least 12 mAh.

36. The alkaline electrochemical cell of any one of claims 1-31, wherein
i) when charging the cell at 0.5 mA, at 21°C, the cell has a charging capacity to a voltage selected from the group consisting of 1.7, 1.8, 1.9, 2.0, 2.1, and 2.2 V of at least 25 mAh;
(ii) when charging the cell at 1 mA, at 21°C, the cell has a charging capacity to a voltage selected from the group consisting of 1.7, 1.8, 1.9, 2.0, 2.1, and 2.2 V of at least 22 mAh;
(iii) when charging the cell at 5 mA, at 21°C, the cell has a charging capacity to a voltage selected from the group consisting of 1.7, 1.8, 1.9, 2.0, 2.1, and 2.2 V of at least 17 mAh;
(iv) when charging the cell at 10 mA, at 21°C, the cell has a charging capacity to a voltage selected from the group consisting of 1.7, 1.8, 1.9, 2.0, 2.1, and 2.2 V of at least 14 mAh;
(v) when charging the cell at 50 mA, at 21°C, the cell has a charging capacity to a voltage selected from the group consisting of 1.7, 1.8, 1.9, 2.0, 2.1, and 2.2 V of at least 13 mAh; or
(vi) when charging the cell at 100 mA, at 21°C, the cell has a charging capacity to a voltage selected from the group consisting of 1.7, 1.8, 1.9, 2.0, 2.1, and 2.2 V of at least 12 mAh.