AMENDED CLAIMS
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We claim:

1. A battery operated system comprising:

one or more electronic components;

a battery to supply power to the one or more electronic components; and

a charger coupled to the battery, the charger including:

a charge cycle initiator to place the battery in a first constant voltage charging mode;

a current decrease unit to monitor a diminishing current of the battery while the battery is in the first constant voltage charging mode; and

a mode modifier to place the battery in a constant current charging mode when the diminishing current falls to a first predetermined threshold.

2. The system of claim 1, wherein the charger further includes a voltage increase unit to monitor a rising voltage of the battery while the battery is in the constant current charging mode, wherein the mode modifier is to place the battery in a second constant voltage charging mode at an end of the charge cycle in response to the rising voltage reaching a second predetermined threshold.

3. The system of any one of claims 1 or 2, wherein the charger further includes a charge current adapter to adjust a charge current corresponding to the constant current charging mode based on a charge capacity of the battery.

4. The system of claim 3, wherein the charge current adapter is to maintain a constant C-rate for the battery.

5. The system of claim 4, wherein the charge current adapter includes:

a capacity initializer to determine an initial full-charge capacity of the battery prior to an initial charge cycle;

a current initializer to determine an initial charge current setting for the battery; and

a C-rate unit to determine the constant C-rate based on the initial full-charge capacity and the initial charge current setting.

6. The system of claim 5, wherein the charge current adapter further includes a capacity monitor to determine a subsequent full-charge capacity of the battery after the initial charge cycle, wherein the charge current is to be adjusted based on the subsequent full-charge capacity and the constant C-rate.

7. A method of adaptively charging a battery, comprising:

placing a battery in a first constant voltage charging mode;

monitoring a diminishing current of the battery while the battery is in the first constant voltage charging mode; and

placing the battery in a constant current charging mode when the diminishing current falls to a first predetermined threshold.

8. The method of claim 7, further including:

monitoring a rising voltage of the battery while the battery is in the constant current charging mode; and

placing the battery in a second constant voltage charging mode at an end of the charge cycle in response to the rising voltage reaching a second predetermined threshold.

9. The method of any one of claims 7 or 8, further including adjusting a charge current corresponding to the constant current charging mode based on a charge capacity of the battery.

10. The method of claim 9, wherein adjusting the charge current includes maintaining a constant C-rate for the battery.

11. The method of claim 9, further including:

determining an initial full-charge capacity of the battery prior to an initial charge cycle;

determining an initial charge current setting for the battery; and

determining the constant C-rate based on the initial full-charge capacity and the initial charge current setting.

12. The method of claim 11, further including determining a subsequent full-charge capacity of the battery after the initial charge cycle, wherein the charge current is adjusted based on the subsequent full-charge capacity and the constant C-rate.

13. At least one computer readable storage medium comprising a set of instructions which, when executed by a computing device, cause the computing device to:

place a battery in a first constant voltage charging mode;

monitor a diminishing current of the battery while the battery is in the first constant voltage charging mode; and

place the battery in a constant current charging mode when the diminishing current falls to a first predetermined threshold.

14. The at least one computer readable storage medium of claim 13, wherein the instructions, when executed, cause a computing device to:

monitor a rising voltage of the battery while the battery is in the constant current charging mode; and

place the battery in a second constant voltage charging mode at an end of the charge cycle in response to the rising voltage reaching a second predetermined threshold.

15. The at least one computer readable storage medium of any one of claims 13 or 14, wherein the instructions, when executed, cause a computing device to adjust a charge current corresponding to the constant current charging mode based on a charge capacity of the battery.

16. The at least one computer readable storage medium of claim 15, wherein the instructions, when executed, cause a computing device to maintain a constant C-rate for the battery.

17. The at least one computer readable storage medium of claim 15, wherein the instructions, when executed, cause a computing device to:

determine an initial full-charge capacity of the battery prior to an initial charge cycle;

determine an initial charge current setting for the battery; and

determine the constant C-rate based on the initial full-charge capacity and the initial charge current setting.

18. The at least one computer readable storage medium of claim 17, wherein the instructions, when executed, cause a computing device to determine a subsequent full-charge capacity of the battery after the initial charge cycle, wherein the charge current is adjusted based on the subsequent full-charge capacity and the constant C-rate.

19. An adaptive charging apparatus comprising:

a charge cycle initiator to place a battery in a first constant voltage charging mode;

a current decrease unit to monitor a diminishing current of the battery while the battery is in the first constant voltage charging mode; and

a mode modifier to place the battery in a constant current charging mode when the diminishing current falls to a first predetermined threshold.

20. The apparatus of claim 19, further including a voltage increase unit to monitor a rising voltage of the battery while the battery is in the constant current charging mode, wherein the mode modifier is to place the battery in a second constant voltage charging mode at an end of the charge cycle in response to the rising voltage reaching a second predetermined threshold.

21. The apparatus of any one of claims 19 or 20, further including a charge current adapter to adjust a charge current corresponding to the constant current charging mode based on a charge capacity of the battery.

22. The apparatus of claim 21, wherein the charge current adapter is to maintain a constant C-rate for the battery.

23. The apparatus of claim 21, wherein the charge current adapter includes:

a capacity initializer to determine an initial full-charge capacity of the battery prior to an initial charge cycle;

a current initializer to determine an initial charge current setting for the battery; and

a C-rate unit to determine the constant C-rate based on the initial full-charge capacity and the initial charge current setting.

24. The apparatus of claim 23, wherein the charge current adapter further includes a capacity monitor to determine a subsequent full-charge capacity of the battery after the initial charge cycle, wherein the charge current is to be adjusted based on the subsequent full-charge capacity and the constant C-rate.

25. The apparatus of any one of claims 19 or 20, wherein the charge cycle initiator is to place the battery in the first constant voltage charging mode in response to an initial burst charge causing a voltage of the battery to reach a level corresponding to the first constant voltage charging mode.

CLAIMS

We claim:

1. A system comprising:

one or more electronic components;

a battery to supply power to the one or more electronic components; and

a charger coupled to the battery, the charger including:

a charge cycle initiator to place the battery in a first constant voltage charging mode;

a current decrease unit to monitor a diminishing current of the battery while the battery is in the first constant voltage charging mode; and

a mode modifier to place the battery in a constant current charging mode when the diminishing current falls to a first predetermined threshold.

2. The system of claim 1, wherein the charger further includes a voltage increase unit to monitor a rising voltage of the battery while the battery is in the constant current charging mode, wherein the mode modifier is to place the battery in a second constant voltage charging mode at an end of the charge cycle in response to the rising voltage reaching a second predetermined threshold.

3. The system of claim 1, wherein the charger further includes a charge current adapter to adjust a charge current corresponding to the constant current charging mode based on a charge capacity of the battery.

4. The system of claim 3, wherein the charge current adapter is to maintain a constant C-rate for the battery.

5. The system of claim 4, wherein the charge current adapter includes:

a capacity initializer to determine an initial full-charge capacity of the battery prior to an initial charge cycle;

a current initializer to determine an initial charge current setting for the battery; and

a C-rate unit to determine the constant C-rate based on the initial full-charge capacity and the initial charge current setting.

6. The system of claim 5, wherein the charge current adapter further includes a capacity monitor to determine a subsequent full-charge capacity of the battery after the initial charge cycle, wherein the charge current is to be adjusted based on the subsequent full-charge capacity and the constant C-rate.

7. A method comprising:

placing a battery in a first constant voltage charging mode;

monitoring a diminishing current of the battery while the battery is in the first constant voltage charging mode; and

placing the battery in a constant current charging mode when the diminishing current falls to a first predetermined threshold.

8. The method of claim 7, further including:

monitoring a rising voltage of the battery while the battery is in the constant current charging mode; and

placing the battery in a second constant voltage charging mode at an end of the charge cycle in response to the rising voltage reaching a second predetermined threshold.

9. The method of claim 7, further including adjusting a charge current corresponding to the constant current charging mode based on a charge capacity of the battery.

10. The method of claim 9, wherein adjusting the charge current includes maintaining a constant C-rate for the battery.

11. The method of claim 9, further including:

determining an initial full-charge capacity of the battery prior to an initial charge cycle;

determining an initial charge current setting for the battery; and

determining the constant C-rate based on the initial full-charge capacity and the initial charge current setting.

12. The method of claim 11, further including determining a subsequent full-charge capacity of the battery after the initial charge cycle, wherein the charge current is adjusted based on the subsequent full-charge capacity and the constant C-rate.

13. At least one computer readable storage medium comprising a set of instructions which, when executed by a computing device, cause the computing device to:

place a battery in a first constant voltage charging mode;

monitor a diminishing current of the battery while the battery is in the first constant voltage charging mode; and

place the battery in a constant current charging mode when the diminishing current falls to a first predetermined threshold.

14. The at least one computer readable storage medium of claim 13, wherein the instructions, when executed, cause a computing device to:

monitor a rising voltage of the battery while the battery is in the constant current charging mode; and

place the battery in a second constant voltage charging mode at an end of the charge cycle in response to the rising voltage reaching a second predetermined threshold.

15. The at least one computer readable storage medium of claim 13, wherein the instructions, when executed, cause a computing device to adjust a charge current corresponding to the constant current charging mode based on a charge capacity of the battery.

16. The at least one computer readable storage medium of claim 15, wherein the instructions, when executed, cause a computing device to maintain a constant C-rate for the battery.

17. The at least one computer readable storage medium of claim 15, wherein the instructions, when executed, cause a computing device to:

determine an initial full-charge capacity of the battery prior to an initial charge cycle;

determine an initial charge current setting for the battery; and

determine the constant C-rate based on the initial full-charge capacity and the initial charge current setting.

18. The at least one computer readable storage medium of claim 17, wherein the instructions, when executed, cause a computing device to determine a subsequent full-charge capacity of the battery after the initial charge cycle, wherein the charge current is adjusted based on the subsequent full-charge capacity and the constant C-rate.

19. An apparatus comprising:

a charge cycle initiator to place a battery in a first constant voltage charging mode;

a current decrease unit to monitor a diminishing current of the battery while the battery is in the first constant voltage charging mode; and

a mode modifier to place the battery in a constant current charging mode when the diminishing current falls to a first predetermined threshold.

20. The apparatus of claim 19, further including a voltage increase unit to monitor a rising voltage of the battery while the battery is in the constant current charging mode, wherein the mode modifier is to place the battery in a second constant voltage charging mode at an end of the charge cycle in response to the rising voltage reaching a second predetermined threshold.

21. The apparatus of claim 19, further including a charge current adapter to adjust a charge current corresponding to the constant current charging mode based on a charge capacity of the battery.

22. The apparatus of claim 21, wherein the charge current adapter is to maintain a constant C-rate for the battery.

23. The apparatus of claim 21, wherein the charge current adapter includes:

a capacity initializer to determine an initial full-charge capacity of the battery prior to an initial charge cycle;

a current initializer to determine an initial charge current setting for the battery; and

a C-rate unit to determine the constant C-rate based on the initial full-charge capacity and the initial charge current setting.

24. The apparatus of claim 23, wherein the charge current adapter further includes a capacity monitor to determine a subsequent full-charge capacity of the battery after the initial charge cycle, wherein the charge current is to be adjusted based on the subsequent full-charge capacity and the constant C-rate.

25. The apparatus of claim 19, wherein the charge cycle initiator is to place the battery in the first constant voltage charging mode in response to an initial burst charge causing a voltage of the battery to reach a level corresponding to the first constant voltage charging mode.