CLAIMS

1. A system for non-volatile storage comprising:

a storage controller comprising a processor and a memory;

a storage device comprising:

a flow cell comprising a plurality of wells with open sides accessible from a first surface of the flow cell, wherein the wells are adapted to contain polynucleotides,

a fluidics interface, and

a sequencing interface;

a fluidics device to provide one or more fluids to the first surface of the flow cell, wherein the one or more fluids comprise a nucleotide writing reagent and a nucleotide reading reagent;

a sequencing device to sequence polynucleotides within the plurality of wells via the sequencing interface and determine nucleotides; and

a well activation device to:

modify one or more wells from the plurality of wells to provide a set of readable wells, wherein the set of readable wells allow exposure to the nucleotide reading reagent and prevent exposure to other reagents from the fluidics device, and

modify one or more wells from the plurality of wells to provide a set of writeable wells, wherein the set of writeable wells allow exposure to the nucleotide writing reagent and prevent exposure to other reagents from the fluidics device.

2. The system of claim 1, wherein the well activation device comprises a plurality of electrodes, and wherein:

at least one electrode of the plurality of electrodes is positioned proximately to each well of the plurality of wells,

a control interface of the storage device is coupled with the plurality of electrodes and provides a set of control signals from the storage controller to the plurality of electrodes,

each of the plurality of electrodes produces a voltage based upon the set of control signals, the voltage comprising a first voltage or a second voltage, and

the first voltage produced by an electrode of the plurality of electrodes modifies a well of the plurality of wells proximate to the electrode producing the first voltage as a readable well and the second voltage produced by an electrode of the plurality of electrodes modifies a well of the plurality of wells proximate to the electrode producing the second voltage as a writeable well.

3. The system of claim 2, wherein the at least one electrode is positioned on a sidewall of each well of the plurality of wells.

4. The system of any one or more of claims 2 through 3, wherein the at least one electrode is positioned on the first surface at a perimeter of each well of the plurality of wells.

5. The system of any one or more of claim 2 through 4, wherein the at least one electrode is positioned at the bottom of each well of the plurality of wells, and wherein the at least one electrode comprises a ring shape that allows light to pass from a second surface of the flow cell, opposite the first surface, through the ring shape and into the well of the plurality of wells in which the at least one electrode is positioned.

6. The system of any one or more of claims 2 through 5, wherein the second voltage causes hybridization of an inhibitor of an enzyme for the well of the plurality of wells proximate to the electrode producing the second voltage and binds a

desired nucleotide in the well of the plurality of wells proximate to the electrode producing the second voltage.

7. The system of any one or more of claims 1 through 6, wherein:

the well activation device comprises a plurality of pH control devices, each pH control device corresponding to a well of the plurality of wells, and

each of the pH control devices produces a voltage that controls pH of a voltage sensitive functionalized fluid provided by the fluidics device to modify the well of the plurality of wells corresponding to the pH control device as either a readable well or a writeable well.

8. The system of any one or more of claims 1 through 7, wherein:

the well activations device comprises a spatial light modulator (SLM) to emit light into one or more wells of the plurality of wells, and

the emitted light modifies each of the one or more wells as either a readable well or a writeable well.

9. The system of any one or more of claims 1 through 8, wherein the storage controller is to, during a sequencing operation:

receive a set of address data that describes nucleotides of polynucleotides in an address well of the plurality of wells, from the sequencing device,

determine a set of target wells from the plurality of wells based on the set of address data, and

cause the fluidic device to provide the nucleotide reading reagent only to the set of target wells.

10. The system of claim 9, wherein the storage controller is to, during the sequencing operation, control localization of enzymes of the nucleotide reading

reagent by causing the fluidic device to strip enzymes from the plurality of wells, and causing the well activation device to provide charged tags.

11. The system of any one or more of claims 1 through 10, wherein the well activation device comprises:

an electrical release mechanism to produce a voltage to modify a well as a writeable well, and

a photonic release mechanism to produce photonic energy to modify a well as a writeable well, and

wherein the set of writeable wells comprises wells modified by the electrical release mechanism and wells modified by the photonic release mechanism.

12. The system of any one or more of claims 1 through 11, wherein:

the well activation device comprises an electro-wetting device proximate to the first surface of the flow cell,

the electro-wetting device is to deliver fluid from the fluidic device to any well of the plurality of wells, and

the storage controller, during a simultaneous sequencing and synthesis operation:

provides a droplet of the nucleotide reading reagent to a first well of the plurality of wells,

provides a droplet of the nucleotide writing reagent to a second well of the plurality of wells, wherein the first well and the second well are adjacent.

13. The system of any one or more of claims 1 through 12, wherein each of the plurality of wells comprises:

a polarization feature to reduce cross-talk between nearby wells, and

an optical waveguide feature to reduce cross talk between nearby wells.

14. The system of any one or more of claims 1 through 13, wherein the storage controller is to, during a synthesis operation:

convert a set of data into a set of nucleotides,

synthesize a first polynucleotide strand in a first well of the set of writeable wells based on the set of nucleotides, and

synthesize a second polynucleotide strand in a second well of the set of writeable wells based on the set of nucleotides, wherein the first polynucleotide strand and the second polynucleotide strand are identical when correctly synthesized.

15. The system of claim 14, wherein the storage controller sequences the first polynucleotide strand and the second polynucleotide strand with the sequencing device and, where the first polynucleotide strand and the second polynucleotide strand are not identical, provides an indication of a synthesis error.

16. The system of any one or more of claims 14 through 15, further comprising a spatial light modulator to project optical patterns onto the flow cell via the sequencing interface, wherein the storage controller operates the spatial light modulator to project an identical optical pattern into the first well and the second well to synthesize the first polynucleotide strand and the second polynucleotide strand.

17. The system of any one or more of claims 1 through 16, wherein the storage controller is to, during a synthesis operation:

convert a set of data into a set of nucleotides,

synthesize a first polynucleotide strand in a first well of the set of writeable wells based on a first portion of the set of nucleotides, and

in parallel with synthesis of the first polynucleotide strand, synthesize a second polynucleotide strand in a second well of the set of writeable wells based on a second portion of the set of nucleotides, wherein the first polynucleotide strand and the second polynucleotide

strand collectively represent the entirety of the set of nucleotides.

18. The system of any one or more of claims 1 through 17, wherein the storage controller is to, during a synthesis operation:

convert a set of data into a set of nucleotides,

synthesize a first polynucleotide strand in a first well of the set of writeable wells based on the set of nucleotides,

synthesize a second polynucleotide strand in the first well based on the set of nucleotides, wherein the first polynucleotide strand and the second polynucleotide strand are identical when correctly synthesized,

produce a strand hash value based on the set of nucleotides, and

synthesize the first polynucleotide strand and the second polynucleotide strand to add the strand hash value.

19. The system of claim 18, wherein the storage controller is to, during a sequencing operation:

sequence the first polynucleotide strand and the second polynucleotide strand in the first well with the sequencing device to determine a sequenced set of nucleotides and a sequenced hash value for each,

where the sequenced set of nucleotides for the first polynucleotide strand and the second polynucleotide strand are not identical, provide an indication of a synthesis error, and

where the sequenced hash value for either the first polynucleotide strand or the second polynucleotide strand does not match a subsequent hash value of the sequenced set of nucleotides, provide an indication of a hash value mismatch.

20. A method for non-volatile storage comprising:

mounting a storage device, the storage device comprising:

a flow cell comprising a plurality of wells with open sides accessible from a first surface of the flow cell, wherein the wells are adapted to contain polynucleotides,

a fluidics interface, and

a sequencing interface;

performing a synthesis operation to produce polynucleotides in the plurality of wells by operating a fluidics device to provide a nucleotide writing reagent to the first surface;

performing a sequencing operation with a sequencing device and a nucleotide reading reagent from the fluidics device to determine nucleotides of polynucleotides in the plurality of wells; and

using a well activation device prior to the synthesis operation and the sequencing operation to:

modify one or more wells from the plurality of wells to provide a set of readable wells, wherein the set of readable wells allow exposure to the nucleotide reading reagent and prevent exposure to other reagent fluids from the fluidics device, and

modify one or more wells from the plurality of wells to provide a set of writeable wells, wherein the set of writeable wells allow exposure to the nucleotide writing reagent and prevent exposure to other reagent fluids from the fluidics device.

21. The method of claim 20, wherein using the well activation device comprises operating a plurality of electrodes of the well activation device, and wherein:

at least one electrode of the plurality of electrodes is positioned proximately to each well of the plurality of wells,

a control interface of the storage device is coupled with the plurality of electrodes and provides a set of control signals to the plurality of electrodes,

each of the plurality of electrodes produce a voltage based upon the set of control signals, the voltage comprising a first voltage or a second voltage, and

the first voltage modifies a well of the plurality of wells proximate to the electrode producing the first voltage as a readable well and the second voltage produced by an electrode of the plurality of electrodes modifies a well of the plurality of wells proximate to the electrode producing the second voltage as a writeable well.

22. The method of claim 21, wherein operating the plurality of electrodes comprises operating at least one electrode positioned on a sidewall of a well of the plurality of wells.

23. The method of any one or more of claims 21 through 22, wherein operating the plurality of electrodes comprises operating at least one electrode positioned on the first surface at a perimeter of a well of the plurality of wells.

24. The method of any one or more of claims 21 through 23, wherein operating the plurality of electrodes comprises operating at least one electrode positioned at the bottom of a well of the plurality of wells, and wherein the at least one electrode comprises a ring shape that allows light to pass from a second surface of the flow cell, opposite the first surface, through the ring shape and into the well of the plurality of wells in which the at least one electrode is positioned.

25. The method of any one or more of claims 21 through 24, further comprising configuring the second voltage to cause hybridization of an inhibitor of an enzyme for the well of the plurality of wells proximate to the electrode producing the second voltage and bind a desired nucleotide to the well of the plurality of wells proximate to the electrode producing the second voltage.

26. The method of any one or more of claims 20 through 25, wherein using the well activation device comprises operating a plurality of pH control devices of the well activation device, and wherein:

each pH control device corresponds to a well of the plurality of wells, and

each of the pH control devices produce a voltage that controls pH of a voltage sensitive functionalized fluid provided by the fluidics device to modify the well of the plurality of wells corresponding to the pH control device as either a readable well or a writeable well.

27. The method of any one or more of claims 20 through 26, wherein operating the well activation device comprises operating a spatial light modulator (SLM) to emit light into one or more wells of the plurality of wells, and wherein the emitted light modifies each of the one or more wells as either a readable well or a writeable well.

28. The method of any one or more of claims 20 through 27, further comprising, during the sequencing operation:

receiving a set of address data from the sequencing device that describes nucleotides of sequenced polynucleotides from an address well of the plurality of wells,

determining a set of target wells from the plurality of wells based on the set of address data, and

causing the fluidic device to provide the nucleotide reading reagent only to the set of target wells.

29. The method of claim 28, further comprising controlling localization of enzymes of the nucleotide reading reagent by causing the fluidic device to strip unneeded enzymes from the plurality of wells, and causing the well activation device to provide charged tags.

30. The method of any one or more of claims 20 through 29, wherein using the well activation device comprises:

using an electrical release mechanism of the well activation device to produce a voltage to modify a well as a writeable well, and

using a photonic release mechanism of the well activation device to produce photonic energy to modify a well as a writeable well, and

wherein the set of writeable wells comprises wells modified by the electrical release mechanism and wells modified by the photonic release mechanism.

31. The method of any one or more of claims 20 through 30, wherein operating the well activation device comprises:

operating an electro-wetting device of the well activation device to deliver fluid from the fluidic device to the plurality of wells, and

during a simultaneous sequencing and synthesis operation:

providing a droplet of the nucleotide reading reagent to a first well of the plurality of wells, and

providing a droplet of the nucleotide writing reagent to a second well of the plurality of wells, wherein the first well and the second well are adjacent.

32. The method of any one or more of claims 20 through 31, further comprising, during the synthesis operation:

converting a set of data into a set of nucleotides,

synthesizing a first polynucleotide strand in a first well of the set of writeable wells based on the set of nucleotides, and

synthesizing a second polynucleotide strand in a second well of the set of writeable wells based on the set of nucleotides, wherein the first polynucleotide strand and

the second polynucleotide strand are identical when correctly synthesized.

33. The method of claim 32, further comprising sequencing the first polynucleotide strand and the second polynucleotide strand with the sequencing device and, where they are not identical, providing an indication of a synthesis error.

34. The method of any one or more of claims 32 through 33, further comprising operating a spatial light modulator to project an identical optical pattern onto the first well and the second well via the sequencing interface, wherein the identical optical pattern is to synthesize the first polynucleotide strand and the second polynucleotide strand in parallel.

35. The method of any one or more of claims 20 through 34, further comprising, during the synthesis operation:

converting a set of data into a set of nucleotides,

synthesizing a first polynucleotide strand in a first well of the set of writeable wells based on a first portion of the set of nucleotides, and

in parallel with synthesizing the first polynucleotide strand, synthesizing a second polynucleotide strand in a second well of the set of writeable wells based on a second portion of the set of nucleotides, wherein the first polynucleotide strand and the second polynucleotide strand collectively represent the entirety of the set of nucleotides.

36. The method of any one or more of claims 20 through 35, further comprising, during the synthesis operation:

converting a set of data into a set of nucleotides,

synthesizing a first polynucleotide strand in a first well of the set of writeable wells based on the set of nucleotides,

synthesizing a second polynucleotide strand in the first well based on the set of nucleotides, wherein the first polynucleotide strand and the second polynucleotide strand are identical when correctly synthesized,

producing a strand hash value based on the set of nucleotides, and

synthesizing the first polynucleotide strand and the second polynucleotide strand to add the strand hash value.

37. The method of claim 36, further comprising, during the sequencing operation:

sequencing the first polynucleotide strand and the second polynucleotide strand in the first well with the sequencing device to determine a sequenced set of nucleotides and a sequenced hash value for each,

where the sequenced set of nucleotides for the first polynucleotide strand and the second polynucleotide strand are not identical, providing an indication of a synthesis error,

determine a subsequent hash value for each of the first polynucleotide strand and the second polynucleotide strand based on the sequenced set of nucleotides, and

where the sequenced hash value for either the first polynucleotide strand or the second polynucleotide strand does not match the subsequent hash value of the sequenced set of nucleotides, provide an indication of a hash value mismatch.

38. A system for non-volatile storage comprising:

a storage controller comprising a processor and a memory;

a storage device comprising:

a flow cell comprising a plurality of wells with open sides accessible from a first surface of the flow cell, wherein the wells are adapted to contain polynucleotides,

a fluidics interface, and

a sequencing interface;

a fluidics device to provide one or more fluids to the first surface of the flow cell, wherein the one or more fluids comprise a nucleotide writing reagent and a nucleotide reading reagent;

a sequencing device to sequence polynucleotides within the plurality of wells via the sequencing interface and determine nucleotides; and

a cache memory comprising an electronic memory to store data that is queued to be encoded into a set of nucleotides and synthesized into polynucleotides in the plurality of wells.

39. The system of claim 38, wherein the cache memory is positioned in the storage device, and wherein the storage device is a removable storage device.

40. The system of any one or more of claims 38 through 39, wherein the cache memory stores one or more of:

a set of file indexes describing the name and location of data stored as polynucleotides within the plurality of wells, and

a set of checksum values usable to verify the integrity of data stored as polynucleotides within the plurality of wells.

41. The system of any one or more of claims 38 through 40, wherein the storage controller:

receives a set of input data to be written to the storage device as polynucleotides in the plurality of wells,

receives a request for output data to be read from polynucleotides stored in the plurality of wells,

determines whether the storage device is in a write-mode or a read-mode based upon whether it has most recently received the nucleotide writing reagent or the nucleotide reading reagent from the fluidics device,

where the storage device is in the write-mode, writes the set of input data prior to reading the output data, and

where the storage device is in the read-mode, stores the set of input data on the cache memory and reads the output data prior to writing the set of input data.

42. The system of any one or more of claims 38 through 41, further comprising an electro-wetting device positioned proximately to the first surface and to deliver fluid from the fluidics device to any well of the plurality of wells, wherein the storage controller:

operates the electro-wetting device to provide a droplet of the nucleotide reading reagent to a first well of the plurality of wells to enable sequencing the polynucleotides stored therein,

while providing the droplet of the nucleotide reading reagent to the first well, identifies a second well, based upon a plurality of requests for output data, that is most proximately located to the first well, and

operates the electro-wetting device to provide a portion of the droplet of the nucleotide reading reagent to the second well of the plurality of wells to sequence the polynucleotides stored therein.

43. The system of any one or more of claims 38 through 42, wherein the storage controller:

determines a subset of the plurality of wells that are most frequently sequenced based upon past requests for output data,

operates the sequencing device to sequence the subset of the plurality of wells and produce a set of nucleotides describing the polynucleotides stored in the subset of the plurality of wells,

converts the set of nucleotides into a set of digital data,

stores the set of digital data in the cache memory, and

provides the set of digital data from the cache memory in response to subsequent requests.

44. A system for non-volatile storage comprising:

a storage controller comprising a processor and a memory;

a storage device comprising:

a first flow cell comprising a first plurality of wells, wherein the first plurality of wells is adapted to contain polynucleotides,

a second flow cell comprising a second plurality of wells, wherein the second plurality of wells are adapted to contain polynucleotides,

a fluidics interface, and

a sequencing interface;

a fluidics device to provide one or more fluids to the first plurality of wells and the second plurality of wells, wherein the one or more fluids comprise a nucleotide writing reagent and a nucleotide reading reagent; and

a sequencing device to sequence polynucleotides within the first plurality of wells and the second plurality of wells via the sequencing interface and determine nucleotides;

wherein the storage controller, when in a mirroring mode:

converts a set of data into a set of nucleotides, and

operates the fluidics device to create identical polynucleotides in the first plurality of wells and the second plurality of wells based on the set of data.

45. The system of claim 44, further comprising a spatial light modulator to project optical patterns onto the first flow cell and the second flow cell via the sequencing interface, wherein the storage controller operates the spatial light modulator to project an identical optical pattern into a first well of the first plurality of wells and a second well of the second plurality of wells to synthesize a first polynucleotide strand and a second polynucleotide strand.

46. The system of any one or more of claims 44 through 45, wherein the storage controller, when in a dedicated mode:

converts the set of data into a set of nucleotides,

designates the first plurality of wells for writing of data and designates the second plurality of wells for reading of data,

operates the fluidics device to create polynucleotides in the first plurality of wells based on the set of data, and

operates the fluidics device and the sequencing device to sequence polynucleotides in the second plurality of wells based upon an output request.

47. The system of claim 46, wherein the storage controller:

determines that there are no current output requests, and

switches from the dedicated mode to the mirroring mode.

48. A method of operating a storage device comprising:

generating one or more commands to write specified data to a polynucleotide associated with a particular location in a storage device;

reading the polynucleotide;

performing a comparison, wherein the comparison compares the polynucleotide stored in the storage device with a particular quality control value stored in a non-nucleotide memory; and

based on the comparison, determining if the particular location in the storage device is to be treated as having corrupted data.

49. The method of claim 48, wherein reading the polynucleotide, performing the comparison, and determining if the particular location in the storage device is to be treated as having corrupted data are performed automatically based on receiving a command to write to the storage device.

50. The method of any one or more of claims 48 through 49, wherein the method comprises:

determining that the particular location in the storage device is to be treated as having corrupted data; and

based on determining that the particular location in the storage device is to be treated as having corrupted data, writing a new polynucleotide encoding uncorrupted data to the particular location in the storage device.

51. The method of claim 50, wherein the method comprises generating the uncorrupted data based on reading information from one or more other locations in the storage device.

52. The method of any one or more of claims 50 through 51, wherein the method comprises:

based on determining that the particular location in the storage device is to be treated as having corrupted data, and before writing the new polynucleotide encoding uncorrupted data to the particular location in the storage device, updating an index for the storage device to indicate that the particular location in the storage device has corrupted data; and

after writing the new polynucleotide encoding uncorrupted data to the particular location in the storage device, updating the index for the storage device to indicate that the particular location in the storage device does not have corrupted data.

53. The method of any one or more of claims 48 through 52, wherein the method comprises generating the particular quality control value based on the specified data.

54. The method of any one or more of claims 48 through 53, wherein:
the storage device comprises a plurality of addressable locations;
the particular location is comprised by the plurality of addressable locations;
the non-nucleotide memory stores a plurality of quality control values;
the particular quality control value is comprised by the plurality of quality control values; and
each quality control value from the plurality of quality control values is associated with a corresponding addressable location from the plurality of addressable locations.

55. The method of any one or more of claims 48 through 54, wherein:
the polynucleotide comprises a check portion; and
the method comprises generating the check portion based on the specified data.

56. The method of claim 55, wherein the check portion is a parity bit.

57. The method of any one or more of claims 55 through 56, wherein the check portion comprises a methylation or other information preserving modification of a nucleobase in the polynucleotide.

58. The method of any one or more of claims 55 through 57, wherein the check portion encodes data matching the particular quality control value.

59. The method of any one or more of claims 55 through 58, wherein:
a second polynucleotide is stored in the storage device, wherein the second polynucleotide comprises a second check portion

identical to the check portion comprised by the polynucleotide; and

the method comprises, based on identifying a difference between the first polynucleotide and the second polynucleotide, determining that the particular location in the storage device is to be treated as having corrupted data.

60. The method of any one or more of claims 48 through 52, wherein:

the particular quality control value is the specified data; and

the comparison comprises checking if there are any differences between data stored in the polynucleotide and the specified data.

61. The method of any one or more of claims 48-52 or 60 wherein the method comprises:

determining that the particular location in the storage device should not be treated as having corrupted data; and

based on determining that the particular location in the storage device should not be treated as having corrupted data, deleting the particular quality control value stored in the non-nucleotide memory.

62. A system comprising a storage device with one or more non-transitory computer readable media storing instructions for the storage device to perform a method comprising:

generating one or more commands to write specified data to a polynucleotide associated with a particular location in a storage device;

reading the polynucleotide;

performing a comparison, wherein the comparison compares the polynucleotide stored in the storage device with a particular quality control value stored in a non-nucleotide memory; and

based on the comparison, determining if the particular location in the storage device is to be treated as having corrupted data.

63. The system of claim 62, wherein the method further comprises:

reading the polynucleotide;

performing the comparison; and

determining if the particular location in the storage device is to be treated as having corrupted data automatically based on receiving a command to write to the storage device.

64. The system of any one or more of claims 62-63, wherein the method comprises:

determining that the particular location in the storage device is to be treated as having corrupted data; and

based on determining that the particular location in the storage device is to be treated as having corrupted data, writing a new polynucleotide encoding uncorrupted data to the particular location in the storage device.

65. The system of claim 64, wherein the method comprises generating the uncorrupted data based on reading information from one or more other locations in the storage device.

66. The system of any one or more of claims 64-65, wherein the method comprises:

based on determining that the particular location in the storage device is to be treated as having corrupted data, and before writing the new polynucleotide encoding uncorrupted data to the particular location in the storage device, updating an index for the storage device to indicate that the particular location in the storage device has corrupted data; and

after writing the new polynucleotide encoding uncorrupted data to the particular location in the storage device, updating the index for

the storage device to indicate that the particular location in the storage device does not have corrupted data.

67. The system of any one or more of claims 62-66, wherein the method comprises generating the particular quality control value based on the specified data.

68. The system of any one or more of claims 62-67, wherein:

the storage device comprises a plurality of addressable locations;

the particular location is comprised by the plurality of addressable locations;

the non-nucleotide memory stores a plurality of quality control values;

the particular quality control value is comprised by the plurality of quality control values; and

each quality control value from the plurality of quality control values is associated with a corresponding addressable location from the plurality of addressable locations.

69. The system of any one or more of claims 62-68, wherein:

the polynucleotide comprises a check portion; and

the method comprises generating the check portion based on the specified data.

70. The system of claim 69, wherein the check portion is a parity bit.

71. The system of any one or more of claims 69-70, wherein the check portion comprises a methylation or other information preserving modification of a nucleobase in the polynucleotide.

72. The system of any one or more of claims 69-71, wherein the check portion encodes data matching the particular quality control value.

73. The system of any one or more of claims 69-72, wherein:

a second polynucleotide is stored in the storage device, wherein the second polynucleotide comprises a second check portion identical to the check portion comprised by the polynucleotide; and

the method comprises, based on identifying a difference between the first polynucleotide and the second polynucleotide, determining that the particular location in the storage device is to be treated as having corrupted data.

74. The system of any one or more of claims 62-66, wherein:

the particular quality control value is the specified data; and

the comparison comprises checking if there are any differences between data stored in the polynucleotide and the specified data.

75. The system of any one or more of claims 62-66 or 74 wherein the method comprises:

determining that the particular location in the storage device should not be treated as having corrupted data; and

based on determining that the particular location in the storage device should not be treated as having corrupted data, deleting the particular quality control value stored in the non-nucleotide memory.

76. One or more non-transitory computer readable media storing instructions for a storage device to perform a method comprising:

generating one or more commands to write specified data to a polynucleotide associated with a particular location in a storage device;

reading the polynucleotide;

performing a comparison, wherein the comparison compares the polynucleotide stored in the storage device with a particular quality control value stored in a non-nucleotide memory; and

based on the comparison, determining if the particular location in the storage device is to be treated as having corrupted data.

77. The computer readable media of claim 76, wherein the method further comprises:

reading the polynucleotide;

performing the comparison; and

determining if the particular location in the storage device is to be treated as having corrupted data

automatically based on receiving a command to write to the storage device.

78. The computer readable media of any one or more of claims 76-77, wherein the method comprises:

determining that the particular location in the storage device is to be treated as having corrupted data; and

based on determining that the particular location in the storage device is to be treated as having corrupted data, writing a new polynucleotide encoding uncorrupted data to the particular location in the storage device.

79. The computer readable media of claim 78, wherein the method comprises generating the uncorrupted data based on reading information from one or more other locations in the storage device.

80. The computer readable media of any one or more of claims 78-79, wherein the method comprises:

based on determining that the particular location in the storage device is to be treated as having corrupted data, and before writing the new polynucleotide encoding uncorrupted data to the particular location in the storage device, updating an index for the storage device to indicate that the particular location in the storage device has corrupted data; and

after writing the new polynucleotide encoding uncorrupted data to the particular location in the storage device, updating the index for the storage device to indicate that the particular location in the storage device does not have corrupted data.

81. The computer readable media of any one or more of claims 76-80, wherein the method comprises generating the particular quality control value based on the specified data.

82. The computer readable media of any one or more of claims 76-81, wherein:

the storage device comprises a plurality of addressable locations;

the particular location is comprised by the plurality of addressable locations;

the non-nucleotide memory stores a plurality of quality control values;

the particular quality control value is comprised by the plurality of quality control values; and

each quality control value from the plurality of quality control values is associated with a corresponding addressable location from the plurality of addressable locations.

83. The computer readable media of any one or more of claims 76-82, wherein:

the polynucleotide comprises a check portion; and

the method comprises generating the check portion based on the specified data.

84. The computer readable media of claim 83, wherein the check portion is a parity bit.

85. The computer readable media of any one or more of claims 83-84, wherein the check portion comprises a methylation or other information preserving modification of a nucleobase in the polynucleotide.

86. The computer readable media of any one or more of claims 83-85, wherein the check portion encodes data matching the particular quality control value.

87. The computer readable media of any one or more of claims 83-86, wherein:

a second polynucleotide is stored in the storage device, wherein the second polynucleotide comprises a second check portion identical to the check portion comprised by the polynucleotide; and

the method comprises, based on identifying a difference between the first polynucleotide and the second polynucleotide, determining that the particular location in the storage device is to be treated as having corrupted data.

88. The computer readable media of any one or more of claims 76-80, wherein:

the particular quality control value is the specified data; and

the comparison comprises checking if there are any differences between data stored in the polynucleotide and the specified data.

89. The computer readable media of any one or more of claims 76-80 or 88 wherein the method comprises:

determining that the particular location in the storage device should not be treated as having corrupted data; and

based on determining that the particular location in the storage device should not be treated as having corrupted data, deleting the particular quality control value stored in the non-nucleotide memory.