based on the first primer sequence; (iii) sequencing the plurality of QC polynucleotides; and (iv) aligning the plurality of QC polynucleotides against a reference to estimate an error rate in the data polynucleotides, a synthesis uniformity in the data polynucleotides, or a combination thereof for QC the data polynucleotides. In some instances, the error rate, the synthesis uniformity, or a combination thereof is based at least in part on a relative read count of the plurality of QC polynucleotides. In some instances, the plurality of QC polynucleotides is about or less 1% of the polynucleotides on the surface. In some instances, the plurality of QC polynucleotides are provided at a portion of the surface. In some instances, the plurality of QC polynucleotides are provided in uniformly on the surface. In some instances, the data polynucleotides comprise a second primer sequence. In some instances, the first primer sequence is different than the second primer sequence. In some instances, the first primer sequence and the second primer sequence are different lengths. In some instances, the quality control is performed after synthesis of the data polynucleotides. In some instances, the QC is performed prior to cleavage of the data polynucleotides from the surface. In some instances, each of the QC polynucleotides is about 50 to 200 nucleobases in length. In some instances, each of the data polynucleotides is about 100 to about 300 nucleobases in length.

[006] Further provided in an aspect is a method for quality control (QC) of data polynucleotides, comprising: (i) selecting a subset of a plurality of data polynucleotides; (ii) applying an inner codec to the subset of the plurality of data polynucleotides, wherein the inner codec comprises probabilistic decoding; and (iii) estimating an error rate in the plurality of polynucleotides based at least in part on a likelihood associated with each decoded sequence in the subset of the plurality of data polynucleotides. In some instances, a high likelihood is associated with a lower error rate. In some instances, a low likelihood is associated with a higher error rate. In some instances, further comprising decoding an index of the subset of the data polynucleotides. In some instances, the index is decoded using the inner codec, an outer codec, or a combination thereof. In some instances, the index is used to estimate a relative distribution of the subset of the plurality of data polynucleotides. In some instances, the QC is performed during synthesis of the polynucleotides, QC of stored polynucleotides, or a combination thereof. In some instances, the subset of the plurality of the data polynucleotides are selected at random. In some instances, the subset of the plurality of the data polynucleotides are selected based at least in part on their location on a surface. In some instances, the plurality of data polynucleotides comprises about 100,000 polynucleotides. In some instances, the subset of the plurality of data polynucleotides is about 0.1 % of the plurality of data polynucleotides. In some instances, the method is used in conjunction with current sensing, optical imaging, flow sensing, size estimation, quality estimation, mass estimation, or any combination thereof. In some instances, the current sensing comprises measuring a current of a chip or a section of the chip. In some instances, the current is compared to a reference value. In some instances, a difference between the current and the reference value is indicative of a chip failure, a deblocking failure, or a combination thereof. In some instances, the current sensing is performed before synthesis of the plurality of data polynucleotides. In some instances, the current sensing is used to detect a chip defect, adjust

polynucleotide synthesis locations on a chip, or a combination thereof. In some instances, mass estimation is performed using fluorescence. In some instances, the fluorescence is used to detect a yield of the plurality of polynucleotides. In some instances, optical imaging comprises detecting a chip defect, non-uniformity, or a combination thereof.

[007] Also provided herein in an example is a method of performing QC of a plurality of cells on a surface, comprising: (i) measuring a current of each cell in the plurality of cells on the surface; (ii) determining if one or more cells in the plurality of cells comprises a defect based at least in part on the current; and (iii) synthesizing and/or storing polynucleotides at a second one or more cells in the plurality of cells, wherein the second one or more cells do not comprise the defect. In some instances, the defect comprises a physical defect. In some instances, the surface is a synthesis surface, a storage surface, or a combination thereof. In some instances, further comprising blocking the one or more cells comprising the defect. In some instances, blocking is performed by a protecting group on the surface. In some instances, blocking is performed by a photolabile protecting group on the surface. In some instances, blocking is performed by selectively supplying energy to the one or more cells. In some instances, blocking is performed by a masking material. In some instances, blocking is performed by addressable control of each cell in the plurality of cells.

BRIEF DESCRIPTION OF THE DRAWINGS

[008] A better understanding of the features and advantages of the present subject matter will be obtained by reference to the following detailed description that sets forth illustrative embodiments and the accompanying drawings of which:

[009] **FIG. 1** shows a non-limiting example of quality control of polynucleotides post-synthesis in accordance with some embodiments.

[010] **FIG. 2** shows a non-limiting example of periodic quality control of stored polynucleotides in accordance with some embodiments.

[011] **FIG. 3** shows a non-limiting example of digital information storage in accordance with some embodiments.

[012] **FIG. 4** shows a non-limiting example of generating a hash in accordance with some embodiments.

[013] **FIG. 5** shows a non-limiting example of an encoding scheme, including an outer codec, in accordance with some embodiments.

[014] **FIG. 6** shows a non-limiting example of an encoding scheme, including shuffling lanes of binary data, in accordance with some embodiments.

[015] **FIG. 7** shows a shows a non-limiting example of an encoding scheme, including an inner codec, in accordance with some embodiments.