CLAIMS

What is claimed is:

1. A system for data storage comprising:

a computing system comprising at least one processor and instructions executable by the at least one processor to perform one or more operations comprising:

receiving digital information;

encoding digital information in one or more nucleic acid sequences; and

synthesizing a library of polynucleotides corresponding to the nucleic acid sequences; and

a modular rack-mount synthesis unit, wherein the modular rack-mount synthesis unit comprises:

a computer controller;

one or more reservoirs;

at least one flow cell block comprising one or more flow cells;

an extraction stage;

a post-processing unit;

a storage unit;

a robotic interference; and/or

a rack interface.

2. The system of claim 1, wherein the at least one flow cell block comprises at least 12 flow cells.

3. The system of claim 1, wherein the one or more flow cells comprise:

one or more solid supports configured for synthesizing the library of polynucleotides; and

one or more ports for exchanging gases, synthesis reagents, and/or extracted polynucleotides.

4. The system of claim 1, wherein the modular rack-mount synthesis unit comprises the extraction stage and/or the post-processing unit, and the extraction stage and/or the post-processing unit comprises:

an energy supply chain; and

one or more ports for exchanging synthesis reagents and/or extracted polynucleotides.

5. The system of claim 1, wherein the modular rack-mount synthesis unit comprises the storage unit, and the storage unit comprises:

a storage plate;

a robotic interface configured to move storage plates; and

an access port.

6. The system of claim 1, wherein the modular rack-mount synthesis unit comprises the rack interface, and the rack interface comprises:

a power supply;

a rack reagent bulkhead;

a synthesis unit reagent bulkhead;

one or more reservoirs;

an energy supply chain; and

a pilot valve bank.

7. The system of claim 1, wherein the storage unit provides the library of polynucleotides to a sequencing unit configured to sequence the library of polynucleotides.

8. The system of claim 1, further comprising one or more sensors configured to:

detect a status, wherein the status comprises a temperature, a pressure, a humidity, a change in voltage, a change in current, a capacitance, a conductivity, a storage plate position, a liquid volume, a flow rate, and/or a presence of a liquid; and

report the status to the computing system.

9. The system of claim 8, wherein the modular rack-mount synthesis unit comprises the at least one flow cell block, and the one or more sensors are further configured to pause synthesis at the one or more flow cells or the at least one flow cell block.

10. The system of claim 9, wherein the system is a first system for data storage, and wherein the computing system is configured to divert encoded data from (i) a paused flow cell or (ii) a paused flow cell block to an active flow cell, an active flow cell block, or to a second system for data storage.

11. The system of claim 1, wherein the computing system further comprises a cache, wherein digital information is retained in the cache until polynucleotides encoding the digital information are stored.

12. The system of claim 1, further comprising:

an assembly for storing information, comprising:

a plurality of compartments comprising a first material, the plurality of compartments configured to receive a plurality of polynucleotides from the library of nucleotides;

a base plate comprising a second material; and

a cover plate comprising a third material,

wherein a coefficient of thermal expansion (CTE) of the first material, the second material, or both, is less than the third material.

13. The system of claim 12, wherein the plurality of compartments are positioned in an array on the base plate.

14. The system of claim 13, wherein the base plate, the cover plate, or both, comprise a plurality of recessed features, and wherein each compartment is located at least partially within a recessed feature.

15. The system of claim 12, wherein the first material comprises borosilicate.

16. The system of claim 12, wherein the second material has a specific heat capacity of about 0.5 J/k-°C to 2.5 J/k-°C.

17. The system of claim 12, wherein the third material includes:
a CTE of about 15 μm/m-°C to 20 μm/m-°C;
a thermal conductivity of about 15 W/m-K to about 20 W/m-K; and/or
a specific heat capacity of about 0.5 J/g-°C.

18. The system of claim 12, wherein the third material comprises stainless steel.