Claims

1. A method, comprising:

exposing a sample to nucleic acid probes;

exposing the nucleic acid probes to primary amplifier nucleic acids able to bind to the nucleic acid probes;

determining a distribution of the nucleic acid probes within the sample using fluorescence; and

creating codewords based on the fluorescence distribution within the sample.

2. A method, comprising:

exposing a sample to nucleic acid probes;

exposing the nucleic acid probes to primary amplifier nucleic acids able to bind to the nucleic acid probes;

exposing the primary amplifier nucleic acids to secondary amplifier nucleic acids able to bind to the primary amplifier nucleic acids;

determining a distribution of the nucleic acid probes within the sample using fluorescence; and

creating codewords based on the fluorescence distribution within the sample.

3. The method of claim 2, further comprising exposing the secondary amplifier nucleic acids to one or more additional rounds of amplifier nucleic acids, including an ending round of amplifier nucleic acids, each able to bind the amplifier nucleic acids of the previous round.

4. The method of claim 3, wherein the ending amplifier nucleic acids comprise a fluorescent signaling entity.

5. The method of claim 3, further comprising exposing the ending round of amplifier

nucleic acids to a fluorescent signaling entity.

6. The method of any one of claims 4 or 5, wherein the ending amplifier nucleic acids have a repeating sequence that the fluorescent signaling entity is able to bind.

7. A method, comprising:

exposing a sample to a binding entity conjugated to a nucleic acid probe;

exposing the nucleic acid probes to primary amplifier nucleic acids able to bind to the nucleic acid probes;

determining a distribution of the nucleic acid probes within the sample using fluorescence; and

creating codewords based on the fluorescence distribution within the sample.

8. A method, comprising:

exposing a sample to a targeting entity conjugated to a nucleic acid probe;

exposing the nucleic acid probes to primary amplifier nucleic acids able to bind to the nucleic acid probes;

exposing the primary amplifier nucleic acids to secondary amplifier nucleic acids able to bind to the primary amplifier nucleic acids;

determining a distribution of the nucleic acid probes within the sample using fluorescence; and

creating codewords based on the fluorescence distribution within the sample.

9. The method of claim 8, further comprising exposing the secondary amplifier nucleic acids to one or more additional rounds of amplifier nucleic acids, including an ending round of amplifier nucleic acids, each able to bind the amplifier nucleic acids of the previous round.

10. The method of claim 9, wherein the ending amplifier nucleic acids comprise a

fluorescent signaling entity.

11. The method of claim 9, further comprising exposing the ending round of amplifier nucleic acids to a fluorescent signaling entity.

12. The method of any one of claims 10 or 11, wherein the ending amplifier nucleic acids have a repeating sequence that the fluorescent signaling entity is able to bind.

13. A method, comprising:

exposing a sample to a targeting entity conjugated to a nucleic acid probe;

exposing the nucleic acid probes to primary amplifier nucleic acids able to bind to the nucleic acid probes, wherein the primary amplifier nucleic acids are formed from only 3 of the 4 naturally-occurring nucleotides;

determining a distribution of the nucleic acid probes within the sample using fluorescence; and

creating codewords based on the fluorescence distribution within the sample.

14. The method of claim 13, further comprising exposing the secondary amplifier nucleic acids to one or more additional rounds of amplifier nucleic acids, including an ending round of amplifier nucleic acids, each able to bind the amplifier nucleic acids of the previous round.

15. The method of claim 14, wherein the ending amplifier nucleic acids comprise a fluorescent signaling entity.

16. The method of claim 14, further comprising exposing the ending round of amplifier nucleic acids to a fluorescent signaling entity.

17. The method of any one of claims 15 or 16, wherein the ending amplifier nucleic acids have a repeating sequence that the fluorescent signaling entity is able to

bind.

18. The method of any one of claims 13-17, wherein for at least some of the codewords, matching the codeword to a valid codeword.

19. The method of claim 18, wherein, if no match is found, potentially applying error correction to the codeword to form a valid codeword

20. The method of any one of claims 13-19, wherein at least one of the one or more additional rounds of amplifier nucleic acids is formed from only 3 of the 4 naturally occurring nucleotides.