

CLAIMS

We claim:

1. A process of synthesizing a desired nucleic acid comprising:
 - (a) combining in a single vessel a nucleic acid substrate, an excess of free unblocked nucleoside triphosphate and at least one template independent nucleic acid polymerase;
 - (b) reacting the mixture in part (a) under conditions in which the at least one template independent nucleic acid polymerase is active and adds only a single nucleotide to the nucleic acid substrate molecule present in the reaction to form a new nucleic acid molecule without any changes to or in the reaction triggering or inducing changes in the activity of the template independent nucleic acid polymerase;
 - (c) separating the new nucleic acid molecule from free nucleotides and optionally from the at least one template independent nucleic acid polymerase; and
 - (d) repeating steps (a)-(c) to obtain the desired synthesized nucleic acid, wherein the new nucleic acid molecule of step (c) serves as the nucleic acid substrate of step (a) until the desired nucleic acid is synthesized.
2. The process of Claim 1 wherein the nucleic acid substrate is RNA.
3. The process of Claim 1 wherein the nucleic acid substrate is DNA.
4. The process of Claim 1 wherein the nucleic acid substrate is a chimeric nucleic acid containing both ribonucleotides and deoxyribonucleotides.
5. The process of any one of Claims 1-4 wherein the synthesized nucleic acid is RNA.
6. The process of any one of Claims 1-4 wherein the synthesized nucleic acid is DNA.
7. The process of any one of Claims 1-4 wherein the synthesized nucleic acid is a chimeric molecule containing both ribonucleotides and deoxyribonucleotides.
8. The process of any one of Claims 1-8 wherein the nucleic acid polymerase is an RNA polymerase.
9. The process of any one of Claims 1-8 wherein the nucleic acid polymerase is a DNA polymerase.

10. The process of any one of Claims 1-8 wherein the nucleic acid polymerase is an X family DNA polymerase.
11. The process of any one of Claims 1-8 wherein the nucleic acid polymerase is a Y family DNA polymerase.
12. The process according to any one of claims 1-11, wherein the nucleic acid substrate is immobilized on a solid support.
13. The process according to any one of claims 1-12, wherein the template independent nucleic acid polymerase is 36-100% efficient at adding only a single nucleotide to the nucleic acid substrate.
14. The process according to any one of claims 1-13, wherein the template independent nucleic acid polymerase is 60-100% efficient at adding only a single nucleotide to the nucleic acid substrate.
15. The process according to any one of claims 1-14, wherein the template independent nucleic acid polymerase is 80-100% efficient at adding only a single nucleotide to the nucleic acid substrate.
16. The process according to any one of claims 1-15, wherein the template independent nucleic acid polymerase is 90-100% efficient at adding only a single nucleotide to the nucleic acid substrate.
17. The process according to any one of claims 1-16, wherein the template independent nucleic acid polymerase is 100% efficient at adding only a single nucleotide to the nucleic acid substrate.
18. The process according to any one of claims 1-17, wherein there is a molar excess of template independent nucleic acid polymerase to nucleic acid substrate ends.
19. The process according to any one of claims 1-17, wherein there are equimolar amounts of template independent nucleic acid polymerase and nucleic acid substrate ends.
20. The process according to any one of claims 1-17, wherein there is a molar excess of nucleic acid substrate ends to template independent nucleic acid polymerase.
21. The process according to any one of claims 1-20, wherein the at least one template independent nucleic acid polymerase used in (d) is different from the at least one template independent nucleic acid polymerase used in step (a).

22. The process according to any one of claims 1-21, wherein the at least one template independent nucleic acid polymerase is immobilized on a solid support.