CLAIMS

1. An automated system for receiving biological sequence information and activating the synthesis of a functional biological entity, comprising:

a receiving unit for receiving a signal encoding biological sequence information transmitted from a transmitting unit, the transmitting unit present at a remote location from the receiving unit;

an assembly unit connected to the receiving unit, for assembling the biological entity according to the biological sequence information, the assembly unit comprising or connected to vessels containing biological building block molecules and containing components for transporting reagents within the system and for executing steps in an automated method for synthesizing the functional biological entity through multiple levels of biological assembly, wherein the multiple levels of biological assembly comprise 1) the synthesis of a plurality of oligonucleotides by linking nucleotides or nucleoside phosphoramidites, and 2) the assembly of one or more dsDNA molecule(s) by joining the plurality of oligonucleotides;

wherein the receiving unit receives the biological sequence information and provides it to the assembly unit, and the assembly unit comprises components for the assembly of the biological entity in an automated method.

2. The system of claim 1 wherein the transmitting unit and the receiving unit are computers that are part of a computer network.

3. The automaled system of claim 2 wherein the transmitting unit is at least 10 miles away from the receiving unit.

4. The automated system of claim **1** wherein the transmitting unit is at least 10 miles away from the receiving unit.

5. The system of claim **4** wherein the biological building blocks are dNTPs or nucleoside phosphoramidites.

6. The system of claim **5** further comprising programming instructions for assembling the dNTPs or nucleoside phosphoramidites into a set of oligonucleotides according to the biological sequence information.

7. The system of claim **6** further comprising one or more vessels containing reagents for the transcription and/or translation of the DNA molecule into a biological product.

8. The system of claim **6** further comprising programming instructions for assembling the set of oligonucleotides into a DNA molecule.

9. The system of claim **8** wherein the assembly unit further converts the biological entity into a biological product.

10. The system of claim **9** wherein the biological product is a virus particle or a portion of a virus particle.

11. The system of claim **10** wherein the virus particle or portion of a virus particle comprises a protein antigen.

12. The system of claim **9** wherein the assembly unit further comprises or is connected to a vessel comprising a host cell.

13. The automated system of claim **8** wherein the DNA molecule is at least 500 bp in length.

14. The system of claim **4** wherein the biological sequence information encodes a nucleic acid encoding for at least a portion of a virus particle or bacteriophage.

15. The system of claim **4** wherein the biological building blocks are nucleoside phosporamidites.

16. The system of claim **1** further comprising programming instructions for performing steps of an automated method in distinct zones of a reaction container.

17. A method of synthesizing a functional biological entity comprising:

receiving biological sequence information from a transmitting unit in an automated system for synthesizing the functional biological entity, the automated system comprising:

a receiving unit for receiving a signal encoding the biological sequence information transmitted from the transmitting unit, the receiving unit present at a remote location from the transmitting unit;

an assembly unit connected to the receiving unit, for assembling the functional biological entity according to the biological sequence information, the assembly unit comprising or connected to vessels containing biological building block molecules and reagents for performing reactions to synthesize the functional biological entity through multiple levels of biological assembly from the biological building block molecules, wherein the multiple levels of biological assembly comprise 1) the synthesis of a plurality of oligonucleotides by linking nucleotides or nucleoside phosphoramidites, and 2) the assembly of one or more dsDNA molecule(s) by joining the plurality of oligonucleotides;

wherein the assembly unit is configured to assemble the biological entity in accordance with the biological sequence information; and

synthesizing the functional biological entity in an automated method.

18. The method of claim **17** wherein the transmitting unit and the receiving unit are computers that are part of a computer network.

19. The method of claim **17** wherein the assembly unit is prepared for assembly of the functional biological entity prior to receiving the biological sequence information.

20. The method of claim **17** wherein the biological building blocks are dNTPs or nucleoside phosphoramidites.

21. The method of claim **20** wherein the system further comprises programming instructions for assembling the dNTPs or nucleoside phosphoramidites into a set of oligonucleotides according to the biological sequence information.

22. The method of claim **21** wherein the system further comprises programming instructions for assembling the set of oligonucleotides into a DNA molecule.

23. The method of claim **22** wherein the system comprises one or more vessels and reagents for the transcription of the DNA molecule into an RNA molecule.

24. The method of claim **23** wherein the system further comprises one or more vessels and reagents for the in vitro translation of the RNA molecule into a functional protein or peptide.

25. The method of claim **24** wherein the functional protein or peptide is a viral protein or peptide.

26. The method of claim **20** wherein the biological building blocks are nucleoside phosphoramidites.

27. The method of claim **17** wherein the functional biological entity is a DNA molecule.

28. The method of claim **27** wherein the DNA molecule is larger than 5 kb.

29. The method of claim **17** wherein the biological sequence information encodes for a nucleic acid molecule encoding for at least a portion of a virus particle.

30. The method of claim **17** wherein the building block molecules are linked in an in vitro reaction to form building block polymers.

31. The method of claim **30** wherein the building block molecules are nucleotides or nucleoside phosphoramidites and the building block polymers are oligonucleotides.

32. The method of claim **31** further comprising transporting oligonucleotides from a first zone of a reaction container to a second zone of the reaction container.

33. The method of claim **31** further comprising performing one step of the method in a first zone of the reaction container and a second step of the method in a second zone of the reaction container.

34. The method of method of claim **29** comprising a DNA assembly step and a RNA transcription step.

35. The method of claim **34** the DNA assembly step is performed in a first reaction zone of the reaction container and the RNA transcription step is performed in a second reaction zone of the reaction container.

36. The method of claim **34** further comprising a step comprising the in vivo production of viral particles in a third reaction zone of the reaction container.

37. An automated system for the synthesis of a double-stranded DNA molecule according to provided biological sequence information, comprising:

an assembly unit for assembling the double-stranded DNA molecule according to the provided biological sequence information, the assembly unit comprising or connected to vessels containing biological building block molecules and containing components for trans-

porting reagents within the system and for executing steps in an automated method for synthesizing the double-stranded DNA molecule through multiple levels of biological assembly, wherein the multiple levels of biological assembly comprise 1) the synthesis of a plurality of oligonucleotides by linking nucleotides or nucleoside phosphoramidites, and 2) the assembly of one or more dsDNA molecule(s) by joining the plurality of oligonucleotides;

and further comprising software programming instructions for the assembly of the biological building block molecules into the double stranded DNA molecule in the automated method.

38. The automated system of claim **37** wherein the biological building block molecules comprise oligonucleotides, dNTPs or nucleoside phosphoramidites.

39. The automated system of claim **38** wherein the software programming comprises instructions for simultaneously assembling the oligonucleotides, dNTPs, or nucleoside phosphoramidites.

40. The automated system of claim **38** wherein the biological building block molecules further comprise a nucleic acid selected from the group consisting of: a plasmid, a vector, a regulatory sequence, a promoter sequence, a binding element for a trans-acting factor, and a signal sequence.

41. The automated system of claim **38** wherein the biological building block molecules are nucleoside phosphoramidites.

42. The automated system of claim **37** wherein the system further comprises software and reagents for the transcription of the DNA molecule into an RNA molecule.

43. The automated system of claim **42** wherein the system further comprises software and reagents for the translation of the RNA molecule into a protein molecule.

44. The automated system of claim **37** wherein the double stranded DNA molecule is greater than 500 bp in size.