What is Claimed is:

1. A ~~calibration~~ cassette for use in an automated biological material engineering system, comprising:

a low temperature chamber including a media storage vessel and a first array of sealed temperature probes in the media storage vessel;

a high temperature chamber separated from the low temperature chamber by a thermal barrier, the high temperature chamber including a cell culture chamber and a second array of sealed temperature probes in the cell culture chamber;

one or more fluidics pathways connected to the cell culture chamber and the media storage vessel, and including a third array of sealed temperature probes in the one or more fluidics pathways; and

electrical connection elements that are electrically connected to each of the first, second, and third arrays of sealed temperature probes.

2. The ~~calibration~~ cassette of claim 1 or claim 11, wherein the media storage vessel is a bag, and wherein the first array of sealed temperature probes are attached to an internal surface of the bag.

3. The ~~calibration~~ cassette of claim 1, ~~or~~ claim 2, or claim 11, wherein the cell culture chamber is flat and substantially non-flexible, and wherein the second array of sealed temperature probes are attached to a bottom and/or a side of the cell culture chamber.

4. The ~~calibration~~ cassette of any one of claims 1-3 or 11, wherein the one or more fluidics pathways include tubing and connectors, and wherein the third array of sealed temperature probes are located within the tubing.

5. The ~~calibration~~ cassette of any one of claims 1-4 or 11, wherein the first, second, and third arrays of sealed temperature probes include resistance temperature detectors (RTD) hermetically sealed by a polymeric cover.

6. The ~~calibration~~ cassette of any one of claims 1-5 or 11, wherein the first, second, and third arrays of sealed temperature probes each include at least 2 sealed temperature probes.

7. The ~~calibration~~ cassette of claim 6, wherein the first, second, and third arrays of sealed temperature probes each include between 2-4 sealed temperature probes.

8. The ~~calibration~~ cassette of claim 7, wherein the first, second, and third arrays of sealed temperature probes in total include 12 sealed temperature probes.

9. The ~~calibration~~ cassette of any one of claims 1-8 or 11, wherein the electric connection elements are electrically connected to a control circuit associated with the ~~calibration~~ cassette.

10. The ~~calibration~~ cassette of any one of claims 1-8 or 11, wherein the electric connection elements are configured to be electrically connected to a control circuit associated with the automated biological material engineering system.

11. A ~~production~~ cassette for use in an automated ~~cell~~ biological material engineering system, comprising:

a low temperature chamber including a ~~cell culture~~ media storage vessel and a first array of sealed temperature probes in the ~~cell culture~~ media storage vessel;

a high temperature chamber for carrying out activation, transduction and/or expansion of a cell culture, the high temperature chamber separated from the low temperature chamber by a thermal barrier, the high temperature chamber including a cell culture chamber and a second array of sealed temperature probes in the cell culture chamber;

one or more fluidics pathways connected to the cell culture chamber and the ~~cell culture~~ media storage vessel, and including a third array of sealed temperature probes in the one or more fluidics pathways; and

electric connection elements that are electrically connected to each of the first, second, and third arrays of sealed temperature probes,

wherein the one or more fluidics pathways provide recirculation, removal of waste, and homogenous gas exchange and distribution of nutrients to the cell culture chamber.

~~12. The production cassette of claim 11, wherein the cell culture media storage vessel is a bag, and wherein the first array of sealed temperature probes are attached to an internal surface of the bag.~~

~~13. The production cassette of claim 11 or claim 12, wherein the cell culture chamber is flat and substantially non-flexible, and wherein the second array of sealed temperature probes in the cell culture chamber are attached to a bottom and/or a side of the cell culture chamber.~~

~~14. The production cassette of any one of claims 11-13, wherein the one or more fluidics pathways include tubing and connectors, and wherein the third array of sealed temperature probes are located within the tubing.~~

~~15. The production cassette of any one of claims 11-14, wherein the first, second, and third arrays of sealed temperature probes include resistance temperature detectors (RTD) hermetically sealed by a polymeric cover.~~

~~16. The production cassette of any one of claims 11-15, wherein the first, second and third arrays of sealed temperature probes each include at least 2 sealed temperature probes.~~

~~17. The production cassette of claim 16, wherein the first, second, and third arrays of sealed temperature probes each include between 2-4 sealed temperature probes.~~

~~18. The production cassette of claim 17, wherein the first, second, and third arrays of sealed temperature probes in total include 12 sealed temperature probes.~~

~~19. The production cassette of any one of claims 11-18, wherein the electric connection elements are electrically connected to a control circuit associated with the production cassette.~~

~~20. The production cassette of any one of claims 11-18, wherein the electric connection elements are configured to be connected to a control circuit associated with the automated cell engineering system.~~

~~21~~12. A method of temperature monitoring in an automated biological material engineering system, the method comprising:

receiving, by a control circuit, a set of internal temperature measurements during a time period when a first cassette is housed in the automated biological material engineering system, wherein the set of internal temperature measurements indicate temperature within the first cassette, and are generated during the time period by an array of temperature probes disposed within the first cassette;

receiving, by the control circuit, an ambient temperature measurement when the first cassette is housed in the automated biological material engineering system, wherein the ambient temperature measurement indicates temperature outside the first cassette, and is generated during the time period by a system temperature probe of the automated biological material engineering system that is disposed outside the first cassette; and

determining, by the control circuit, a set of temperature offset values that indicate respective differences between the set of internal temperature measurements and the ambient temperature measurement.

~~22~~13. The method of claim ~~21~~12, wherein the control circuit is associated with the first cassette.

~~23~~14. The method of claim ~~21~~12, wherein the control circuit is associated with the automated biological material engineering system.

~~24~~15. The method of any one of claims ~~21~~12-~~23~~14, wherein the automated biological material engineering system is an automated cell engineering system.

~~25~~16. The method of any one of claims ~~21~~12-~~24~~ 15 , wherein the array of temperature probes is disposed at multiple respective locations within the first cassette, and the set of internal temperature measurements corresponds to the multiple respective locations within the first cassette, wherein the method further comprises:

generating, based on the set of internal temperature measurements, a temperature map that indicates how temperature varies spatially across the first cassette.

~~26~~17. The method of claim ~~25~~16, wherein the set of internal temperature measurements is a first set of internal temperature measurements corresponding to a first point in time within the time period, and wherein the temperature map is a first temperature map that indicates how temperature varies spatially across the first cassette at the first point in time within the time period, wherein the method further comprises:

receiving a second set of internal temperature measurements generated by the array of temperature probes in the first cassette, wherein the second set of internal temperature measurements indicate temperature at the multiple respective locations at a second point in time within the time period; and

generating, based on the second set of internal temperature measurements, a second temperature map that indicates how temperature varies spatially across the first cassette at the second point in time within the time period.

~~27~~18. The method of claim ~~26~~17, wherein the ambient temperature measurement is a first ambient temperature measurement corresponding to the first point in time within the time period, and the set of temperature offset values is a first set of temperature offset values also corresponding to the first point in time, wherein the method further comprises:

receiving a second ambient temperature measurement that indicates temperature outside the first cassette at the second point in time within the time period; and

determining a second set of temperature offset values that indicate respective differences between the second ambient temperature measurement and the second set

of internal temperature measurements, wherein the second set of temperature offset values correspond to the second point in time,

wherein the first point in time belongs to a first stage of a biological material production process, and the second point in time belongs to a second stage of a biological material production process.

~~28~~19. The method of any one of claims ~~21~~12-~~27~~18, further comprising wirelessly transmitting the set of internal temperature measurements to a computing device.

~~29~~20. A method of temperature control performed in automated biological material engineering system, the method comprising:

receiving, by a control circuit, a set of internal temperature measurements during a first time period when a first cassette is housed in the automated biological material engineering system, wherein the set of internal temperature measurements indicate temperature within the first cassette, and are generated during the first time period by an array of temperature probes disposed within the first cassette;

receiving, by the control circuit, a first ambient temperature measurement when the first cassette is housed in the automated biological material engineering system, wherein the first ambient temperature measurement indicates temperature outside the first cassette, and is generated during the first time period by a system temperature sensor of the automated biological material engineering system that is disposed outside the first cassette;

determining, by the control circuit, a set of temperature offset values that indicate respective differences between the set of internal temperature measurements and the first ambient temperature measurement;

determining, by the control circuit, a target internal temperature value for a location in a second cassette; and

controlling, by the control circuit during a second time period when the second cassette is housed in the automated biological material engineering system, a heating

device or cooling device of the automated biological material engineering system based on the target internal temperature value, the set of temperature offset values, and one or more additional ambient temperature measurement generated by the system temperature sensor during the second time period, wherein the system temperature sensor is disposed outside the second cassette.

~~30~~21. The method of claim ~~29~~20, wherein the automated biological material engineering system is an automated cell engineering system, and the target internal temperature value is a desired cell culture temperature value for a cell culture within the second cassette.

~~31~~22. The method of claim ~~29~~ 20 or claim ~~30~~21, further comprising generating, based on the set of temperature offset values and the one or more additional ambient temperature measurements generated during the second time period, a temperature map that indicates how temperature varies spatially across the second cassette, wherein the heating device or cooling device is controlled based on the temperature map.

~~32~~23. The method of claim ~~31~~22, wherein controlling the heating device or cooling device comprises determining an estimated internal temperature value for the location in the second cassette, wherein the heating device or the cooling device is controlled based on a difference between the estimated internal temperature value and the ~~desired~~ target internal temperature value.

~~33~~24. The method of claim ~~32~~23, wherein controlling the heating device or the cooling device comprises determining a target ambient temperature value based on the estimated internal temperature value and/or the target internal temperature value, wherein the heating device or the cooling device is controlled to cause temperature measured by the system temperature probe to approach the target ambient temperature value.

~~34~~25. The method of claim ~~33~~24, wherein the set of temperature offset values is one of multiple sets of temperature offset values determined during the first time period, wherein the multiple sets correspond to different points in time within the first time period,

wherein the ~~determined~~ generated temperature map corresponds to a point in time within the second time period, and is generated by selecting the set of temperature offset values from among the multiple sets of temperature offset values based on a determination that the set of temperature offset values also corresponds to the point in time within the second time period.

~~35~~26. The method of claim ~~34~~25, wherein the set of temperature offset values is associated with a point in time within the first time period, and wherein the point in time within the first time period and the point in time within the second time period both belong to a same stage of a biological material production process that has multiple stages.

~~36~~27. The method of claim ~~34~~ 25 or ~~35~~26, wherein the temperature map is a first temperature map, the method further comprising:

selecting, at a second point in time within the second time period, a second set of temperature offset values from among the multiple sets of temperature offset values, wherein the selected second set of temperature offset values correspond to the second point in time within the second time period;

generating a second temperature map based on the second set of temperature offset values, wherein the second temperature map is associated with the second point in time within the second time period, and wherein the heating device or the cooling device is controlled based on the second temperature map.

~~37~~28. The method of claim ~~36~~27, wherein the target ambient temperature value is a first target ambient temperature value, the method further comprising: determining a second estimated internal temperature value

determining a second target ambient temperature value based on the second estimated internal temperature value and/or the target internal temperature value; and

controlling the heating device or the cooling device to cause temperature measured by the system temperature probe to transition from the first target ambient temperature value to the second target ambient temperature value.

~~38~~29. The method of claim ~~37~~28, wherein the first target ambient temperature value is higher than the second target ambient temperature value.

~~39~~30. The method of any one of ~~claims 21-38~~ claims 20-29, wherein the second cassette has no temperature sensor disposed therein.