CLAIMS

What is claimed is:

1. An incubator, comprising:

a housing that at least partially encloses an internal container, wherein the internal container has an opening;

a primary air flow control device coupled to the housing and/or internal container and positioned relative to the internal container to direct a primary air veil along or substantially parallel to a hypothetical plane covering the opening;

a secondary air flow control device coupled to the housing and/or internal container and positioned relative to the internal container to direct a secondary air veil substantially parallel to the primary air veil; and

a door coupled to the housing and/or internal container such that the entire door is movable away from the hypothetical plane and such that the entire door is moveable in a horizontal or vertical direction.

2. The incubator of claim 1 wherein the housing, the internal container, and the primary air flow control device are positioned relative to each other to form a recirculation space that allows for recirculation of air in the primary air veil.

3. The incubator of claim 2 wherein the recirculation space at least partially encloses a plurality of sensors selected from the group consisting of a CO_2 sensor, an O_2 sensor, a humidity sensor, an atmospheric pressure sensor, and temperature sensor, and further at least partially encloses a sterilization unit, a high-efficiency particulate air (HEPA) filter, an activated charcoal filter, and/or a heater.

4. The incubator of claim 1 further comprising a primary and/or secondary suction fan, wherein the primary suction fan is positioned to receive air from the primary air veil, and

wherein the secondary suction fan is positioned to receive air from the secondary air veil.

5. The incubator of claim 4 wherein the secondary air flow control device is configured to receive ambient air and wherein the secondary suction fan expels the secondary air veil to the ambient air.

6. The incubator of claim 1 wherein the primary air veil and/or the secondary air veil is a directional veil or a laminar flow veil.

7. The incubator of claim 1 wherein the primary air flow control device recirculates at least 90% of all air in the primary air veil through the recirculation space.

8. The incubator of claim 1 wherein the primary air flow control device further comprises a movable vane that controls a direction of the primary air veil.

9. The incubator of claim 1 further comprising a control unit having a microprocessor and a memory storing instructions executable on the microprocessor, wherein the instructions cause the control unit to:

a) down-regulate the primary air flow control device and optionally cause movement of a vane coupled to the primary air flow control device upon the door moving into a closed position;

b) up-regulate the primary air flow control device and an optional secondary air flow control device upon the door moving into an open position; and/or

c) cause movement of a vane coupled to the primary air flow control device when the door is in the open position.

10. The incubator of claim 9 wherein the control unit is further electronically coupled to a temperature sensor, a gas sensor, an atmospheric pressure sensor, and/or a humidity sensor,

and wherein the instructions cause the control unit to activate a heater, open a gas valve to allow entry of a gas into the incubator, and/or activate a humidifier.

11. The incubator claim 9 wherein the control unit is further electronically coupled to an access control device that is programmed to receive a user command and/or validate an authorized user of the incubator, and wherein the instructions cause the control unit to move the door from the closed to the open position upon receiving the user command and/or validation of the authorized user.

12. The incubator of claim 11 wherein the user commend is a voice command or user gesture, and/or wherein the authorized user is validated by face recognition.

13. The incubator of claim 1 wherein the door, when in a closed position, is positioned in an area otherwise occupied by the secondary air veil.

14. The incubator of claim 1 wherein the primary and/or secondary air veil has an airflow between about 0.3 to 0.6 m/s.

15. The incubator of claim 1 wherein the internal container has a volume of between 10 and 400 L.

16. A method of operating a cell or tissue culture incubator, the incubator having a housing that at least partially encloses an internal container that has an opening, comprising:

using a primary air flow control device that is coupled to the housing and/or internal container to direct a primary air veil along or substantially parallel to a hypothetical plane covering the opening;

using a secondary air flow control device that is coupled to the housing and/or internal container to direct a secondary air veil parallel to the primary air veil; and

wherein the primary and secondary air flow control devices are used when a door that is coupled to the housing and/or internal container is in an open position.

17. The method of claim 16 wherein the door is coupled to the housing and/or internal container such that the entire door is movable away from the hypothetical plane and such that the entire door is moveable in a horizontal or vertical direction.

18. The method of claim 16 wherein the housing, the internal container, and the primary air flow control device are positioned relative to each other to form a recirculation space that allows for recirculation of at least 90% of all air in the primary air veil.

19. The method of claim 18 further comprising measuring least one environmental parameter in the recirculation space using a plurality of sensors at least partially disposed in the recirculation space.

20. The method of claim 16 wherein the secondary air flow control device is not used when the door is in a closed position.