SUMMARY

[0007] An aspect of the application is directed to a method for decontaminating a small enclosure, comprising the steps of: entering input parameters of the small enclosure into a processing unit, wherein the processing unit is programmed to determine fluid properties of a cleaning fluid in a decontamination device based on the input parameters of the small enclosure, activating a decontamination cycle of the decontamination device, wherein the decontamination cycle comprises the steps of: providing a reservoir of the cleaning fluid; setting the determined fluid properties of the cleaning fluid; generating a very dry mist comprising ionized hydrogen peroxide of the cleaning fluid; and dispersing the very dry mist by high voltage actuation, wherein the very dry mist comprises particles having a particle size diameter within the ranges of 0.5-0.9 microns, wherein the generated very dry mist is applied to decontaminate the small enclosure, and wherein the ionized hydrogen peroxide dissociates to form diatomic oxygen and water. The setting of the determined fluid properties to the cleaning fluid is performed by controlling an air valve.

[0008] In certain embodiments, the decontamination device is operated manually. In particular embodiments, the decontamination device is hand-held.

[0009] In certain embodiments, the input parameters of the small enclosure comprise: dimensions of the small enclosure, a position of the decontamination device relative to boundaries of the small enclosure, air temperature, pressure, and humidity of the small enclosure. In particular embodiments, the set fluid properties of the cleaning fluid comprise air pressure and fluid flow rate. In certain embodiments, the air valve is controlled by programming the processing unit to control a potentiometer. In various embodiments, the determined fluid properties of the cleaning fluid are adjusted by a size and a shape of a tube located at an exit of the cleaning fluid out of the decontamination device.

[0010] In particular embodiments, the fluid properties of the cleaning fluid are set by lowering the air pressure and the fluid flow rate respectively below a predetermined standard air pressure and a predetermined standard fluid flow rate.

[0011] In other embodiments, input parameters of a target area are entered into a processing unit, wherein the processing unit is further programmed to determine the fluid properties of the cleaning fluid in the decontamination device based on the input parameters of the target area. The input parameters of the small enclosure may be manually input. The input parameters of the small enclosure are measured by a plurality of sensors that are in networked communication with the processing unit.

[0012] In particular embodiments, the processing unit and the decontamination device are in wireless communication.

[0013] Another aspect of the application is a system for decontaminating a small enclosure, comprising a decontamination device and a computer processor, wherein the

computer processor is in networked communication with the decontamination device, wherein input parameters of the small enclosure are entered into the computer processor, wherein the computer processor is programmed to determine fluid properties of a cleaning fluid in the decontamination device based on the input parameters of the small enclosure, wherein the computer processor is further programmed to activate a decontamination cycle of the decontamination device, the decontamination cycle comprising the steps of: providing a reservoir of the cleaning fluid; setting the determined fluid properties of the cleaning fluid; generating a very dry mist of the cleaning fluid; and dispersing the very dry mist by high voltage actuation, wherein the very dry mist comprises particles having a particle size diameter within the ranges of 0.5-0.9 microns, wherein the generated very dry mist is applied to decontaminate the small enclosure, and wherein the ionized hydrogen peroxide dissociates to form diatomic oxygen and water. The setting of the determined fluid properties to the cleaning fluid is performed by controlling an air valve.

[0014] These and other aspects and embodiments of the present application will become better understood with reference to the following detailed description when considered in association with the accompanying drawings and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] FIG. 1 is a block flow diagram of a general approach for denaturing a biochemical agent using an activated cleaning fluid mist.

[0016] FIG. 2 is a schematic view of a first embodiment of apparatus for denaturing biological agents, with the activator proximally located to the mist generator.

[0017] FIG. 3 is a schematic view of a second embodiment of apparatus for denaturing biological agents, with the activator located remotely from the mist generator.

[0018] FIG. 4 is a schematic view of a third embodiment of apparatus for denaturing biological agents, with both proximate and remote activators.

[0019] FIG. 5 illustrates a streaming decontamination apparatus.

[0020] FIG. 6 illustrates a chamber-based decontamination apparatus.

[0021] FIG. 7 illustrates a decontamination apparatus for decontaminating a room.

[0022] FIG. 8 illustrates a decontamination apparatus for a heating, ventilating, and air conditioning duct system.

[0023] FIG. 9 illustrates a decontamination apparatus for air breathed by a person.

[0024] FIG. 10A represents a configuration of device elements wherein a cleaning fluid source 40 and a mist generator 42 are linked via an actuating device 70 that has an adjustable range of rotation of up to 360 degrees. FIG. 10B represents a configuration of

device elements wherein a cleaning fluid source 40 is interfaced with a mist generator 42 that, in turn, is linked to a mist delivery unit 72 via an actuating device 70 that has an adjustable range of rotation of up to 360 degrees. FIG. 10C represents a configuration of device elements wherein a mist generator 42 is mounted on an actuating device 70 that has an adjustable range of rotation of up to 360 degrees. FIG. 10D represents another configuration of device elements wherein a mist generator

CLAIMS:

1. A method for decontaminating a small enclosure, comprising the steps of:

entering input parameters of the small enclosure into a processing unit, wherein the processing unit is programmed to determine fluid properties of a cleaning fluid in a decontamination device based on the input parameters of the small enclosure space, and

activating a decontamination cycle of the decontamination device, wherein the decontamination cycle comprises the steps of:

providing a reservoir of the cleaning fluid;

setting the determined fluid properties of the cleaning fluid;

generating a very dry mist comprising ionized hydrogen peroxide of the cleaning fluid; and

dispersing the very dry mist by high voltage actuation, wherein the very dry mist comprises particles having a particle size diameter within the ranges of 0.5-0.9 microns,

wherein the generated very dry mist is applied to decontaminate the substantially small enclosure, wherein the ionized hydrogen peroxide dissociates to form diatomic oxygen and water, and

wherein the setting of the determined fluid properties to the cleaning fluid is performed by controlling an air valve.

2. The method of Claim 1, further comprising operating the decontamination device manually.

3. The method of Claim 2, wherein the decontamination device is hand-held to be operated manually.

4. The method of Claim 1, wherein the input parameters of the small enclosure comprise: dimensions of the small enclosure space, a position of the decontamination device relative to boundaries of the small enclosure space, air temperature, pressure, and humidity of the small enclosure.

5. The method of Claim 1, wherein the set fluid properties of the cleaning fluid comprise air pressure and fluid flow rate.

6. The method of Claim 1, wherein the air valve is controlled by programming the processing unit to control a potentiometer.

7. The method of Claim 1, wherein the determined fluid properties of the cleaning fluid are adjusted by a size and a shape of a tube located at an exit of the cleaning fluid out of the decontamination device.

8. The method of Claim 5, wherein the fluid properties of the cleaning fluid are set by lowering the air pressure and the fluid flow rate respectively below a predetermined standard air pressure and a predetermined standard fluid flow rate.

9. The method of Claim 1, further comprising:

entering input parameters of a small enclosure into a processing unit, wherein the processing unit is further programmed to determine the fluid properties of the cleaning fluid in the decontamination device based on the input parameters of the small enclosure.

10. The method of Claim 1, wherein the input parameters of the small enclosure are manually input.

11. The method of Claim 1, wherein the input parameters of the small enclosure are measured by a plurality of sensors that are in networked communication with the processing unit.

12. The method of Claim 1, wherein the processing unit and the decontamination device are in wireless communication.

13. A system for decontaminating a small enclosure, comprising a decontamination device and a computer processor, wherein the computer processor is in networked communication with the decontamination device,

wherein input parameters of the small enclosure space are entered into the computer processor,

wherein the computer processor is programmed to determine fluid properties of a cleaning fluid in the decontamination device based on the input parameters of the small enclosure space,

wherein the computer processor is further programmed to activate a decontamination cycle of the decontamination device, the decontamination cycle comprising the steps of:

providing a reservoir of the cleaning fluid;

setting the determined fluid properties of the cleaning fluid;

generating a very dry mist comprising ionized hydrogen peroxide of the cleaning fluid; and

dispersing the very dry mist by high voltage actuation, wherein the very dry mist comprises particles having a particle size diameter within the ranges of 0.5-0.9 microns,

wherein the generated very dry mist is applied to decontaminate the substantially small enclosure, wherein the ionized hydrogen peroxide dissociates to form diatomic oxygen and water, and

wherein the setting of the determined fluid properties to the cleaning fluid is performed by controlling an air valve.

14. The system of Claim 13, wherein the decontamination device is operated manually.

15. The system of Claim 14, wherein the decontamination device is hand-held to be operated manually.

16. The system of Claim 13, wherein the input parameters of the small enclosure comprise: dimensions of the small enclosure, a position of the decontamination device relative to boundaries of the small enclosure, air temperature, pressure, and humidity of the small enclosure space.

17. The system of Claim 13, wherein the set fluid properties of the cleaning fluid comprise air pressure and fluid flow rate.