

WHAT IS CLAIMED IS:

1. A pest control device comprising:
 - a sensor including a sensor cell, wherein a surface of a sensor cell is coated with an agent that reacts with a targeted biochemical analyte secreted by pests, and
 - a controller coupled to the sensor, the controller being configured to:
 - receive sensor data from the sensor cell indicative of a rate of change in sensor mass detected on the surface of the sensor cell, the rate of change correlating to an increase in the concentration of the targeted biochemical analyte,
 - determine whether the rate of change in the sensor mass based on the received sensor data exceeds a predefined threshold rate, and
 - transmit a pest detection alert notification to a server in response to a determination that the rate of change exceeds the predetermined threshold rate.
2. The pest control device of claim 1 further comprising a handle providing a grip for a human operator to move the pest control device to identify a localized area of the targeted biochemical analyte.
3. The pest control device of claim 1, wherein the controller is further configured to:
 - activate a timer when the rate of change exceeds a predefined threshold rate,
 - deactivate the timer when the rate of change returns to less than the predefined threshold rate,
 - determine an amount of time that the rate of change in the sensor mass exceeded the predefined threshold rate, and
 - determine whether the amount of time is greater than a predefined time period,
 - wherein to transmit the pest detection alert notification comprises to transmit a pest detection alert notification in response to a determination that the amount of time is greater than the predefined time period.
4. The pest control device of claim 1, wherein the predefined threshold rate is a base mass change rate in the presence of bed bugs.
5. The pest control device of claim 1, wherein the targeted biochemical analyte comprises an analyte found in secretion of bed bugs.

6. The pest control device of claim 1, wherein the targeted biochemical analyte comprises trans-2-hexenal (T2H).
7. The pest control device of claim 1, wherein the targeted biochemical analyte comprises trans-2-octenal (T2O).
8. The pest control device of claim 1, wherein the targeted biochemical analyte comprises 4-oxo-(*E*)-2-hexenal.
9. The pest control device of claim 1, wherein the targeted biochemical analyte comprises 4-oxo-(*E*)-2-octenal.
10. The pest control device of claim 1, wherein the agent comprises dioctyl cyclic thiol intermediate (dioctyl-CTI).
11. The pest control device of claim 1, wherein the agent comprises cyclic thiol intermediate (CTI).
12. The pest control device of claim 1, wherein the sensor is a quartz crystal microbalance.
13. The pest control device of claim 1, wherein the sensor cell is a quartz crystal resonator.
14. The pest control device of claim 1, wherein the surface of the sensor cell is coated with a coating gel compound that includes a polymer gel and the agent.
15. The pest control device of claim 14, wherein the polymer gel has high viscosity and high thermal and chemical stability to form a stable coating on the surface of the sensor cell.
16. The pest control device of claim 14, wherein the polymer gel has a low molecular weight.

17. The pest control device of claim 14, wherein the polymer gel is polymethylphenylsiloxane (PMPS).

18. The pest control device of claim 14, wherein the polymer gel is polydimethylsiloxane (PDMS).

19. The pest control device of claim 14, wherein the polymer gel is fluoroalcohol polycarbosilane.

20. The pest control device of claim 14, wherein the polymer gel is fluoroalcohol polysiloxane.

21. The pest control device of claim 14, wherein the polymer gel is bisphenol-containing polymer (BSP3).

22. The pest control device of claim 14, wherein the polymer gel is poly-2-dimethylamin-ethyl-methacrylate (PDMAEMC).

23. The pest control device of claim 14, wherein the polymer gel is polymers with silicone (Si) and iron (F).

24. The pest control device of claim 14, wherein the polymer gel is at least one of polymethylphenylsiloxane (PMPS), polydimethylsiloxane (PDMS), fluoroalcohol polycarbosilane, fluoroalcohol polysiloxane, bisphenol-containing polymer (BSP3), poly-2-dimethylamin-ethyl-methacrylate (PDMAEMC), and polymers with silicone (Si) and iron (F).

25. A method of detecting a presence of pests comprising:
receiving data indicative of a sensor mass rate of change from a sensor,
determining whether the sensor mass rate of change exceeds a predefined threshold rate, and
transmitting a pest detection alert notification to a server in response to a determination that the rate of change exceeds the predetermined threshold rate,
wherein the sensor includes a coating that reacts with a targeted biochemical analyte secreted by pests, and the sensor mass rate of change correlates to an increase in a concentration of a targeted biochemical analyte.
26. The method of claim 25 further comprising:
activating a timer when the rate of change exceeds a predefined threshold rate,
deactivating the timer when the rate of change returns to less than the predefined threshold rate,
determining an amount of time that the rate of change in the sensor mass exceeded the predefined threshold rate, and
determining whether the amount of time is greater than a predefined time period,
wherein transmitting the pest detection alert notification comprises transmitting a pest detection alert notification in response to a determination that the amount of time is greater than the predefined time period.
27. The method of claim 25, wherein the predefined threshold rate is a base mass change rate in the presence of bed bugs.
28. The method of claim 25, wherein the targeted biochemical analyte comprises trans-2-hexenal (T2H).
29. The method of claim 25, wherein the targeted biochemical analyte comprises trans-2-octenal (T2O).
30. The method of claim 25, wherein the targeted biochemical analyte comprises 4-oxo-(*E*)-2-hexenal.

31. The method of claim 25, wherein the targeted biochemical analyte comprises 4-oxo-(*E*)-2-octenal.

32. The method of claim 25, wherein the coating comprises dioctyl cyclic thiol intermediate (dioctyl-CTI).

33. The method of claim 25, wherein the coating comprises cyclic thiol intermediate (CTI).

34. The method of claim 25, wherein the sensor is a quartz crystal microbalance.

35. The method of claim 25, wherein the coating is a coating gel compound that includes a polymer gel and the agent.

36. The method of claim 35, wherein the polymer gel has high viscosity and high thermal and chemical stability to form a stable coating on the surface of the sensor cell.

37. The method of claim 35, wherein the polymer gel has a low molecular weight.

38. The method of claim 35, wherein the polymer gel is polymethylphenylsiloxane (PMPS).

39. The method of claim 35, wherein the polymer gel is polydimethylsiloxane (PDMS).

40. The method of claim 35, wherein the polymer gel is fluoroalcohol polycarbosilane.

41. The method of claim 35, wherein the polymer gel is fluoroalcohol polysiloxane.

42. The method of claim 35, wherein the polymer gel is bisphenol-containing polymer (BSP3).

43. The method of claim 35, wherein the polymer gel is poly-2-dimethylamin-ethyl-methacrylate (PDMAEMC).

44. The method of claim 35, wherein the polymer gel is polymers with silicone (Si) and iron (F).

45. The method of claim 35, wherein the polymer gel is at least one of polymethylphenylsiloxane (PMPS), polydimethylsiloxane (PDMS), fluoroalcohol polycarbosilane, fluoroalcohol polysiloxane, bisphenol-containing polymer (BSP3), poly-2-dimethylamin-ethyl-methacrylate (PDMAEMC), and polymers with silicone (Si) and iron (F).

46. A method of detecting a presence of pests comprising:
receiving first sensor data from a sensor,
receiving second sensor data from the sensor,
determining a first slope of signal change based on the first and second sensor data,
receiving third sensor data from the sensor,
determining a second slope of signal change based on the second and third sensor data,
determining if the second slope is different from the first slope, and
transmitting a pest detection alert notification to a server in response to a determination that the second slope is different from the first slope,
wherein the sensor includes a coating that reacts with a targeted biochemical analyte secreted by pests, and the signal change correlates to an increase in a concentration of a targeted biochemical analyte.

47. The method of claim 46 further comprising:
activating a timer when the second slope is different from the first slope,
receiving sensor data from the sensor and determining a slope of signal change based on the sensor data while the timer is active,
deactivating the timer upon detecting no change in slope,

determining a time interval measured by the timer, and
determining whether the time interval is greater than a predefined time period,
wherein transmitting the pest detection alert notification comprises transmitting
a pest detection alert notification in response to a determination that the time interval is greater
than the predefined time period.

48. The method of claim 46, wherein the predefined threshold rate is a base
mass change rate in the presence of bed bugs.

49. The method of claim 46, wherein the targeted biochemical analyte
comprises trans-2-hexenal (T2H).

50. The method of claim 46, wherein the targeted biochemical analyte
comprises trans-2-octenal (T2O).

51. The method of claim 46, wherein the targeted biochemical analyte
comprises 4-oxo-(*E*)-2-hexenal.

52. The method of claim 46, wherein the targeted biochemical analyte
comprises 4-oxo-(*E*)-2-octenal.

53. The method of claim 46, wherein the coating comprises dioctyl cyclic
thiol intermediate (dioctyl-CTI).

54. The method of claim 46, wherein the coating comprises cyclic thiol
intermediate (CTI).

55. The method of claim 6, wherein the sensor is a quartz crystal
microbalance.

56. A method comprising:
determining an amount of agent available on a pest detection sensor to react with
a targeted biochemical analyte secreted by pests,
determining whether the amount of agent is below a threshold level, and

transmitting a notification to a server indicating that the sensor requires a maintenance in response to a determination that the amount of agent is below the threshold level,

wherein an amount of the agent coated on the pest detection sensor decreases as the agent reacts with the targeted biochemical analyte.

57. The method of claim 56, wherein the agent comprises dioctyl cyclic thiol intermediate (dioctyl-CTI).

58. The method of claim 56, wherein the agent comprises cyclic thiol intermediate (CTI).

59. The method of claim 56, wherein the targeted biochemical analyte comprises an analyte found in secretion of bed bugs.

60. The method of claim 56, wherein the targeted biochemical analyte comprises trans-2-hexenal (T2H).

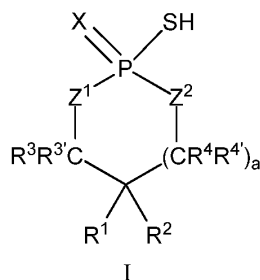
61. The method of claim 56, wherein the targeted biochemical analyte comprises trans-2-octenal (T2O).

62. The method of claim 56, wherein the targeted biochemical analyte comprises 4-oxo-(*E*)-2-hexenal.

63. The method of claim 56, wherein the targeted biochemical analyte comprises 4-oxo-(*E*)-2-octenal.

64. The method of claim 56, wherein the threshold level is determined based on a minimum amount of agent required to react with the targeted biochemical analyte.

65. A cyclic thiol of the formula I



or a tautomer thereof, wherein

X is S or O;

Z¹ and Z² are each independently O or S;

R¹ is selected from the group consisting of hydrogen, C₁-C₁₂ alkyl, C₂-C₁₂ alkenyl, C₆-C₁₀ aryl, 5- to 7-membered heteroaryl, -OR⁵, -SR⁵, -(OC₁-C₄ alkylene)_xR⁵, -(SC₁-C₄ alkylene)_yR⁵, -(OC₁-C₄ alkylene)_x(SC₁-C₄ alkylene)_yR⁵, -(SC₁-C₄ alkylene)_y(OC₁-C₄ alkylene)_xR⁵, C₁-C₃ alkylene(OC₁-C₄ alkylene)_xR⁵, C₁-C₃ alkylene(SC₁-C₄ alkylene)_yR⁵, C₁-C₃ alkylene(OC₁-C₄ alkylene)_x(SC₁-C₄ alkylene)_yR⁵, and C₁-C₃ alkylene(SC₁-C₄ alkylene)_y(OC₁-C₄ alkylene)_xR⁵;

R² is selected from the group consisting of hydrogen, C₃-C₁₂ alkyl, C₂-C₁₂ alkenyl, C₆-C₁₀ aryl, 5- to 7-membered heteroaryl, -OR⁵, -SR⁵, -(OC₁-C₄ alkylene)_xR⁵, -(SC₁-C₄ alkylene)_yR⁵, -(OC₁-C₄ alkylene)_x(SC₁-C₄ alkylene)_yR⁵, -(SC₁-C₄ alkylene)_y(OC₁-C₄ alkylene)_xR⁵, C₁-C₃ alkylene(OC₁-C₄ alkylene)_xR⁵, C₁-C₃ alkylene(SC₁-C₄ alkylene)_yR⁵, C₁-C₃ alkylene(OC₁-C₄ alkylene)_x(SC₁-C₄ alkylene)_yR⁵, and C₁-C₃ alkylene(SC₁-C₄ alkylene)_y(OC₁-C₄ alkylene)_xR⁵;

R³, R^{3'}, R⁴, and R^{4'} are each independently selected from the group consisting of hydrogen, C₁-C₈ alkyl, C₂-C₈ alkenyl, and C₆-C₁₀ aryl;

R⁵ is selected from the group consisting of hydrogen, C₁-C₈ alkyl, C₂-C₈ alkenyl, C₆-C₁₀ aryl, and a polymeric bulking group;

a is 0 or 1; and

x and y are each independently an integer from 1 to 10.

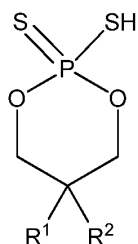
66. The cyclic thiol of claim 65, wherein X is S.

67. The cyclic thiol of claim 65, wherein Z¹ is O.

68. The cyclic thiol of claim 65, wherein Z¹ and Z² are each O.

69. The cyclic thiol of claim 65, wherein X is S, and Z¹ and Z² are each O.
70. The cyclic thiol of claim 65, wherein R¹ and R² are each C₄-C₁₀ alkyl and are the same.
71. The cyclic thiol of claim 65, wherein R¹ and R² are each octyl.
72. The cyclic thiol of claim 65, wherein at least one of R¹ and R² is coupled to the polymeric bulking group.
73. The cyclic thiol of claim 72, wherein at least one of R¹ and R² is hydrogen.
74. The cyclic thiol of claim 72, wherein the polymeric bulking group is selected from the group consisting of a silicone, a polyolefin, a polyamide, a polyester, a polycarbonate, a polyaramide, a polyurethane, a polystyrene, an epoxy, a rubber, a starch, a protein, a cellulose, an acrylate, an ABS polymer, a PEEK polymer, a polyol, polyether, polyetherpolyol, and a copolymer of two or more of the foregoing.
75. The cyclic thiol of claim 74, wherein the polymeric bulking group is a silsesquioxane.
76. The cyclic thiol of claim 74, wherein the polymeric bulking group is crosslinked.
77. The cyclic thiol of claim 72, wherein R¹ is of the formula -CH₂O(CH₂)₃S(CH₂)₃R⁵.
78. The cyclic thiol of claim 65, wherein the cyclic thiol has a weight of about 350 Da to about 5000 Da.
79. The cyclic thiol of claim 65, wherein a is 1.
80. The cyclic thiol of claim 65, wherein R³, R^{3'}, R⁴, and R^{4'} are each hydrogen.

81. The cyclic thiol of claim 65 of the formula

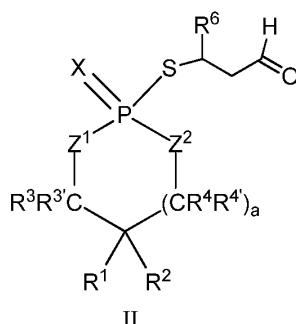


wherein R^1 and R^2 are each independently hexyl or octyl.

82. The cyclic thiol of claim 81, wherein R^1 and R^2 are each octyl.

83. The cyclic thiol of claim 65, wherein the thiol group has a pKa of about 1 to about 4.

84. A cyclic adduct of the formula II



or a tautomer thereof, wherein

X is S or O;

Z^1 and Z^2 are each independently O or S;

R^1 is selected from the group consisting of hydrogen, C_1 - C_{12} alkyl, C_2 - C_{12} alkenyl, C_6 - C_{10} aryl, 5- to 7-membered heteroaryl, $-OR^5$, $-SR^5$, $-(OC_1-C_4 \text{ alkylene})_x R^5$, $-(SC_1-C_4 \text{ alkylene})_y R^5$, $-(OC_1-C_4 \text{ alkylene})_x (SC_1-C_4 \text{ alkylene})_y R^5$, $-(SC_1-C_4 \text{ alkylene})_y (OC_1-C_4 \text{ alkylene})_x R^5$, C_1 - C_3 alkylene $(OC_1-C_4 \text{ alkylene})_x R^5$, C_1 - C_3 alkylene $(SC_1-C_4 \text{ alkylene})_y R^5$, C_1 - C_3 alkylene $(OC_1-C_4 \text{ alkylene})_x (SC_1-C_4 \text{ alkylene})_y R^5$, and C_1 - C_3 alkylene $(SC_1-C_4 \text{ alkylene})_y (OC_1-C_4 \text{ alkylene})_x R^5$;

R^2 is selected from the group consisting of hydrogen, C_1 - C_{12} alkyl, C_2 - C_{12} alkenyl, C_6 - C_{10} aryl, 5- to 7-membered heteroaryl, $-OR^5$, $-SR^5$, $-(OC_1-C_4 \text{ alkylene})_x R^5$, $-(SC_1-C_4 \text{ alkylene})_y R^5$, $-(OC_1-C_4 \text{ alkylene})_x (SC_1-C_4 \text{ alkylene})_y R^5$, $-(SC_1-C_4 \text{ alkylene})_y (OC_1-C_4$

alkylene) $_x$ R⁵, C₁-C₃ alkylene(OC₁-C₄ alkylene) $_x$ R⁵, C₁-C₃ alkylene(SC₁-C₄ alkylene) $_y$ R⁵, C₁-C₃ alkylene(OC₁-C₄ alkylene) $_x$ (SC₁-C₄ alkylene) $_y$ R⁵, and C₁-C₃ alkylene(SC₁-C₄ alkylene) $_y$ (OC₁-C₄ alkylene) $_x$ R⁵;

R³, R^{3'}, R⁴, and R^{4'} are each independently selected from the group consisting of hydrogen, C₁-C₈ alkyl, C₂-C₈ alkenyl, and C₆-C₁₀ aryl;

R⁵ is selected from the group consisting of hydrogen, C₁-C₈ alkyl, C₂-C₈ alkenyl, C₆-C₁₀ aryl, and a polymeric bulking group;

R⁶ is C₁-C₁₂ alkyl or oxo substituted C₁-C₁₂ alkyl;

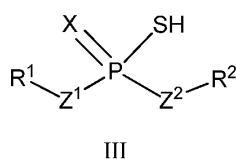
a is 0 or 1; and

x and y are each independently an integer from 1 to 10.

85. The cyclic adduct of claim 84, wherein R⁶ is selected from the group consisting of propyl, pentyl, 1-oxopropyl, and 1-oxopentyl.

86. The cyclic adduct of claim 84, wherein R⁶ is pentyl.

87. A thiol of the formula III



or a tautomer thereof, wherein

X is S or O;

Z¹ and Z² are each independently O or S;

R¹ is selected from the group consisting of hydrogen, C₁-C₁₂ alkyl, C₂-C₁₂ alkenyl, C₆-C₁₀ aryl, 5- to 7-membered heteroaryl, -OR⁵, -SR⁵, -(OC₁-C₄ alkylene) $_x$ R⁵, -(SC₁-C₄ alkylene) $_y$ R⁵, -(OC₁-C₄ alkylene) $_x$ (SC₁-C₄ alkylene) $_y$ R⁵, -(SC₁-C₄ alkylene) $_y$ (OC₁-C₄ alkylene) $_x$ R⁵, C₁-C₃ alkylene(OC₁-C₄ alkylene) $_x$ R⁵, C₁-C₃ alkylene(SC₁-C₄ alkylene) $_y$ R⁵, C₁-C₃ alkylene(OC₁-C₄ alkylene) $_x$ (SC₁-C₄ alkylene) $_y$ R⁵, and C₁-C₃ alkylene(SC₁-C₄ alkylene) $_y$ (OC₁-C₄ alkylene) $_x$ R⁵;

R² is selected from the group consisting of C₃-C₁₂ alkyl, C₂-C₁₂ alkenyl, C₆-C₁₀ aryl, 5- to 7-membered heteroaryl, -OR⁵, -SR⁵, -(OC₁-C₄ alkylene) $_x$ R⁵, -(SC₁-C₄ alkylene) $_y$ R⁵, -(OC₁-C₄ alkylene) $_x$ (SC₁-C₄ alkylene) $_y$ R⁵, -(SC₁-C₄ alkylene) $_y$ (OC₁-C₄ alkylene) $_x$ R⁵, C₁-C₃

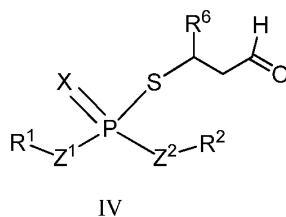
alkylene(OC₁-C₄ alkylene)_xR⁵, C₁-C₃ alkylene(SC₁-C₄ alkylene)_yR⁵, C₁-C₃ alkylene(OC₁-C₄ alkylene)_x(SC₁-C₄ alkylene)_yR⁵, and C₁-C₃ alkylene(SC₁-C₄ alkylene)_y(OC₁-C₄ alkylene)_xR⁵;

R⁵ is selected from the group consisting of hydrogen, C₁-C₈ alkyl, C₂-C₈ alkenyl, C₆-C₁₀ aryl, and a polymeric bulking group;

a is 0 or 1; and

x and y are each independently an integer from 1 to 10.

88. An adduct of the formula IV



or a tautomer thereof, wherein

X is S or O;

Z¹ and Z² are each independently O or S;

R¹ is selected from the group consisting of hydrogen, C₁-C₁₂ alkyl, C₂-C₁₂ alkenyl, C₆-C₁₀ aryl, 5- to 7-membered heteroaryl, -OR⁵, -SR⁵, -(OC₁-C₄ alkylene)_xR⁵, -(SC₁-C₄ alkylene)_yR⁵, -(OC₁-C₄ alkylene)_x(SC₁-C₄ alkylene)_yR⁵, -(SC₁-C₄ alkylene)_y(OC₁-C₄ alkylene)_xR⁵, C₁-C₃ alkylene(OC₁-C₄ alkylene)_xR⁵, C₁-C₃ alkylene(SC₁-C₄ alkylene)_yR⁵, C₁-C₃ alkylene(OC₁-C₄ alkylene)_x(SC₁-C₄ alkylene)_yR⁵, and C₁-C₃ alkylene(SC₁-C₄ alkylene)_y(OC₁-C₄ alkylene)_xR⁵;

R² is selected from the group consisting of hydrogen, C₁-C₁₂ alkyl, C₂-C₁₂ alkenyl, C₆-C₁₀ aryl, 5- to 7-membered heteroaryl, -OR⁵, -SR⁵, -(OC₁-C₄ alkylene)_xR⁵, -(SC₁-C₄ alkylene)_yR⁵, -(OC₁-C₄ alkylene)_x(SC₁-C₄ alkylene)_yR⁵, -(SC₁-C₄ alkylene)_y(OC₁-C₄ alkylene)_xR⁵, C₁-C₃ alkylene(OC₁-C₄ alkylene)_xR⁵, C₁-C₃ alkylene(SC₁-C₄ alkylene)_yR⁵, C₁-C₃ alkylene(OC₁-C₄ alkylene)_x(SC₁-C₄ alkylene)_yR⁵, and C₁-C₃ alkylene(SC₁-C₄ alkylene)_y(OC₁-C₄ alkylene)_xR⁵;

R⁵ is selected from the group consisting of hydrogen, C₁-C₈ alkyl, C₂-C₈ alkenyl, C₆-C₁₀ aryl, and a polymeric bulking group;

R⁶ is C₁-C₁₂ alkyl or oxo substituted C₁-C₁₂ alkyl;

a is 0 or 1; and

x and y are each independently an integer from 1 to 10.

89. A pest control device comprising:
a housing including (i) an inner chamber, (ii) a plurality of inlets opening into the inner chamber, and (iii) a plurality of inner walls dividing the inner chamber into a plurality of channels, each channel sized to receive one or more pests,
any sensor shown and/or described in this application, the sensor being attached to the housing, and
any controller shown and/or described in this application.
90. The pest control device of claim 89, further comprising an airflow device configured to produce an airflow to draw air along the plurality of channels from the inner chamber to the sensor.
91. The pest control device of any of claims 89-90, wherein the housing includes a first panel moveable relative to a second panel to permit access to the inner chamber.
92. The pest control device of claim 89, wherein the first panel is pivotally coupled to the second panel.
93. The pest control device of claim 92, wherein the housing includes an impermeable liner between an outer frame of the first panel and an outer frame of a second panel to minimize a loss of a targeted biochemical analyte through a gap between the outer frames.
94. The pest control device of claim 93, wherein the impermeable liner is an aluminized film.
95. The pest control device of any of claims 91-94, wherein the first panel includes a base surface and the plurality of inner walls extend from the base surface.
96. The pest control device of any of claims 91-95, wherein the first panel includes a ramp surface positioned outside of each inlet to guide pests into the corresponding inlet.

97. The pest control device of any of claims 89-96, wherein the plurality of inner walls include:

a pair of guide walls positioned on each side of an inlet, each guide wall extending in a first direction and defining a first channel of the plurality of channels, and

a barrier wall spaced apart from the ends of the guide walls, the barrier wall extending in a second direction orthogonal to the first direction.

98. The pest control device of claim 97, wherein the barrier wall includes:

a first wall section extending in the second direction orthogonal to the first direction,

a second wall section extending from an end of the first wall section, the second wall section extending parallel to the guide walls and cooperating to define a second channel of the plurality of channels, and

a third wall section extending from an opposite end of the first wall section, the second wall section extending parallel to the guide walls and cooperating to define a third channel of the plurality of channels.

99. The pest control device of claim 98, wherein the first channel is configured to direct the airflow in the first direction and the second and third channels are configured to direct the airflow in a third direction opposite the first direction.

100. The pest control device of any of claims 97-98, wherein

the barrier wall is a first barrier wall, and

the plurality of inner walls includes a second barrier wall spaced apart from the end of the first barrier wall, the first barrier wall and the second barrier wall cooperating to define a fourth channel configured to direct airflow in the first direction.

101. The pest control device of claim 100, wherein the fourth channel is offset from the inlets of housing.

102. The pest control device of any of claims 89-101, wherein the sensor is positioned in the inner chamber of the housing.

103. The pest control device of any of claims 90-101, wherein the airflow device is positioned in the inner chamber.

104. The pest control device of any of claims 89-103, further comprising an external pre-concentrator.

105. The pest control device of claim 104, wherein the pre-concentrator includes a heating element to increase temperature in the inner chamber.

106. The pest control device of claim 104, wherein the pre-concentrator includes a sheet that sorbs a targeted biochemical analyte.

107. The pest control device of claim 104, wherein the sheet is made of a woven or non-woven fibrous material and include sorbent powder between fibers of a sheet of fibrous material.

108. The pest control device of claim 104, wherein the pre-concentrator includes multiple sheets made of a woven or non-woven fibrous material that sorb a targeted biochemical analyte and include sorbent powder between two sheets of a fibrous material.

109. The pest control device of claim 104, wherein the pre-concentrator includes a tube that extends from an inlet of the plurality of inlets to the sensor and sorbs a targeted biochemical analyte.

110. The pest control device of claim 104, wherein the pre-concentrator includes a test chamber sized to receive an amount of a targeted biochemical analyte.

111. The pest control device of any of claims 105-110, wherein the pre-concentrator includes a surface configured to sorb a targeted biochemical analyte at a first temperature and release the targeted biochemical analyte at a second temperature.

112. The pest control device of any of claims 89-111, further comprising a heating element operable to selectively adjust temperature in the inner chamber.

113. The pest control device of claim 112, wherein the heating element is operable increase the temperature to exterminate pests in the inner chamber.

114. The pest control device of any of claims 89-113, wherein the housing is configured to be secured to a bed.

115. The pest control device of any of claims 89-114, further comprising a headboard of a bed, and the housing is configured to be secured to the headboard of the bed.