CLAIM(S):

1. A method for determining and classifying by type aircraft air contaminants, the method comprising:

(a) passing aircraft air through an inlet of an aircraft air contaminant analyzer and through a flow-through heater block and a first valve, wherein the flow-through heater block is arranged to control temperature of the aircraft air passing through the flow-through heater block;

passing a sample of the aircraft air through the aircraft air contaminant analyzer and through at least one aircraft air contaminant collector and a second valve along a first sample flow path at a first sample flow rate and/or at a first sample flow duration, while passing another sample of aircraft air through the aircraft air contaminant analyzer and through a bypass section and a third valve along a second sample flow path bypassing the at least one aircraft air contaminant collector at a second sample flow rate and/or at a second sample flow duration,

the at least one aircraft air contaminant collector comprising:

(i) a microporous medium comprising microporous flow-through channels arranged across the first sample flow path, the microporous medium having a chemoselective coating; and,

(ii) a thin film resistive heater, capable of heating to a temperature that vaporizes captured air contaminants, wherein the heater is in contact with the microporous medium;

the aircraft air contaminant analyzer also including a gravimetric sensor arranged to generate a proportionate resonant frequency response when air contaminant mass is added to or removed from the gravimetric sensor, for classifying air contaminant type; and

wherein the bypass section comprises a bypass channel, the bypass channel including the second sample flow path;

(a') the aircraft air contaminant analyzer further comprising:

a pump generating flow along the first sample flow path and along the second sample flow path;

a pressure sensor arranged between the first valve, the second valve, and the third valve; and

a temperature sensor arranged to measure temperature in the flow-through heater block;

(b) controlling the first sample flow rate and/or the first sample flow duration through the at least one aircraft air contaminant collector along the first sample flow path while independently controlling the second sample flow rate and/or the second sample flow duration through the bypass section along the second sample flow path, wherein the first sample flow rate and/or the first sample flow duration is/are initially set at a low value for a first measurement of response signal magnitude;

(c) capturing air contaminants by the microporous medium;

(d) closing the first valve and the second valve and when a desired pressure is reached based upon a signal from the pressure sensor, closing the third valve and discontinuing passing aircraft air through the at least one aircraft air contaminant collector along the first sample flow path;

(e) heating the microporous medium to a temperature sufficient to vaporize the captured air contaminants and desorb the captured air contaminants;

(f) receiving the desorbed air contaminants on the gravimetric sensor arranged to generate a proportionate resonant frequency response when air contaminant mass is added to or removed from the gravimetric sensor;

(g) measuring the proportionate resonant frequency response generated by the gravimetric sensor as the air contaminant is added to and removed from the gravimetric sensor, determining a signal magnitude from the proportionate resonant frequency response, determining the air contaminant concentration, classifying the air contaminant type, and

outputting the determined air contaminant concentration and classified air contaminant type;

(h) executing an air contaminant recognition program stored upon a computer-readable medium, including calculating air contaminant concentration using the measured signal magnitudes and first sample flow rates and the first sample flow durations along the first sample flow path;

(i) opening the first valve, the second valve, and the third valve;

(j) determining a target level for the signal magnitude, and continuously repeating (b)-(i) and measuring response signal magnitudes and adjusting the first sample flow rate and/or the first sample flow duration based upon the previously measured signal magnitude such that

the first sample flow rate and/or the first sample flow duration is increased when the signal magnitude is lower than the target level, by an amount proportionate to how much lower the signal magnitude is below the target level, to maintain the signal magnitude at the target level, and

the first sample flow rate and/or the first sample flow duration is decreased when signal magnitude is higher than the target level, by an amount proportionate to how much higher the signal magnitude is above the target level, to maintain the signal magnitude at the target level;

(k) executing the air contaminant recognition program stored upon the computer-readable medium, including calculating air contaminant concentration using the measured signal magnitudes and first sample flow rates and the first sample flow durations along the first sample flow path; and,

(l) outputting the determined air contaminant concentration and air contaminant type.

2. A method for determining and classifying by type aircraft air contaminants, the method comprising:

(a) passing aircraft air through an inlet of an aircraft air contaminant analyzer and through a flow-through heater block and a first valve, wherein the flow-through heater block is arranged to control temperature of the aircraft air passing through the flow-through heater block;

(a') the aircraft air contaminant analyzer comprising:

at least a first aircraft air contaminant collector and a second aircraft air contaminant collector;

a first sample flow path including a first sample portion flow path and a second sample portion flow path;

wherein the first aircraft air contaminant collector is arranged along the first sample portion flow path, the aircraft air contaminant analyzer including a first adjustable flow controller communicating with the first sample portion flow path;

and

the second aircraft air contaminant collector is arranged along the second sample portion flow path, the aircraft air contaminant analyzer including a second adjustable flow controller communicating with the second sample portion flow path;

wherein the aircraft air contaminant analyzer includes a second valve arranged downstream of the first sample portion flow path and the second sample portion flow path;

and,

a bypass section providing a bypass sample flow path bypassing the first aircraft air contaminant collector and the first sample portion flow path, and bypassing the second aircraft air contaminant collector and the second sample portion flow path, the bypass section comprising a bypass channel, the bypass channel including the bypass sample flow path;

wherein the aircraft air contaminant analyzer includes a third valve arranged downstream of the bypass sample flow path;

the first aircraft air contaminant collector and the second aircraft air contaminant collector each separately comprising:

(i) a microporous medium comprising microporous flow through channels arranged across the sample portion flow path, the microporous medium having a chemoselective coating; and,

(ii) a thin film resistive heater, capable of heating to a temperature that vaporizes captured air contaminants, wherein the heater is in contact with the microporous medium;

the aircraft air contaminant analyzer also including a gravimetric sensor near each of the first aircraft air contaminant collector and the second aircraft air contaminant collector, each gravimetric sensor arranged to generate a proportionate resonant frequency response when air contaminant mass is added to or removed from the gravimetric sensor, for classifying air contaminant type;

(a") the aircraft air contaminant analyzer further comprising:

a pump generating flow along the first sample portion flow path, the second sample portion flow path, and along the bypass sample flow path;

a pressure sensor arranged between the first valve, the second valve, and the third valve; and

a temperature sensor arranged to measure temperature in the flow through heater block;

(b) passing a first sample of the aircraft air through the aircraft air contaminant analyzer and through the first and second aircraft air contaminant collectors and the second valve along the first sample flow path at a first sample flow rate and at a first sample flow duration, including passing a first sample portion of the first sample through the first aircraft air contaminant collector and passing a second sample portion of the first sample through the second aircraft air contaminant collector;

passing the first sample portion of the aircraft air along the first sample portion flow path at a first sample portion flow rate and at a first sample portion flow duration, and passing the second sample portion of the aircraft air along the second sample portion flow path at a second sample portion flow rate and at a second sample portion flow

duration, wherein the first sample portion flow duration equals the second sample portion flow duration;

while passing another sample of aircraft air through the aircraft air contaminant analyzer and through the bypass section and a third valve along the bypass sample flow path bypassing the first and second aircraft air contaminant collectors at a bypass sample flow rate and at a bypass sample flow duration;

(b') adjusting the first sample portion flow rate and the second sample portion flow rate

such that

the first sample portion flow rate is decreased by adjusting the first adjustable flow controller when a measured signal magnitude by the gravimetric sensor near the first aircraft contaminant collector is higher than a measured signal magnitude by the gravimetric sensor near the second aircraft contaminant collector; and

the second sample portion flow rate is decreased by adjusting the second adjustable flow controller when a measured signal magnitude by the gravimetric sensor near the second aircraft contaminant collector is higher than a measured signal magnitude by the gravimetric sensor near the first aircraft contaminant collector;

(c) controlling the first sample flow rate and/or the first sample flow duration along the first sample portion flow path;

while independently controlling the bypass sample flow rate and/or the bypass sample flow duration through the bypass section along the bypass sample flow path;

wherein the first sample flow rate and/or the first sample flow duration are initially set at a low value for initial measurements of response signal magnitudes;

(d) capturing air contaminants by each microporous medium;

(e) closing the first valve and the second valve and when a desired pressure is reached based upon a signal from the pressure sensor, closing the third valve and discontinuing passing aircraft air through the first and second aircraft air contaminant collector along the first sample portion flow path and the second sample portion flow path;

(f) heating each microporous medium to a temperature sufficient to vaporize the captured air contaminants and desorb the captured air contaminants;

(g) receiving the desorbed air contaminants on each gravimetric sensor arranged to generate a proportionate resonant frequency response when air contaminant mass is added to or removed from the gravimetric sensor;

(h) measuring proportionate resonant frequency response generated by each gravimetric sensor as the air contaminant is added to and removed from each gravimetric sensor, determining the signal magnitude from the proportionate resonant frequency response, determining the air contaminant concentration, classifying the air contaminant type, and outputting the determined air contaminant concentrations and classified air contaminant types;

(i) executing an air contaminant recognition program stored upon a computer readable medium, including calculating air contaminant concentrations using the measured signal magnitudes and the first sample flow rates and the first sample flow duration along the first sample flow path;

(j) opening the first valve, the second valve, and the third valve;

(k) determining a target level for the signal magnitude, and continuously repeating (d)-(j) and measuring response signal magnitudes and adjusting the first sample portion flow rate and/or the first sample portion flow duration such that

the first sample portion flow rate and/or the first sample portion flow duration is increased when the signal magnitude of either

(iv) an average of the previously measured signal magnitudes by the gravimetric sensors near the first aircraft contaminant collector and near second aircraft contaminant collector; or

(v) the previously measured signal magnitude by the gravimetric sensor near the first aircraft contaminant collector; or

(vi) the previously measured signal magnitude by the gravimetric sensor near the second aircraft contaminant collector

is lower than a target level, by an amount proportionate to how much lower the measured signal magnitude is below the target level, to maintain the signal magnitude at the target level, and

the first sample flow rate and/or the first sample flow duration is decreased when the measured signal magnitude of either

(vii) the average of the previously measured signal magnitudes by the gravimetric sensors near the first aircraft contaminant collector and near the second aircraft contaminant collector; or

(viii) the previously measured signal magnitude by the gravimetric sensor near the first aircraft contaminant collector; or

(ix) the previously measured signal magnitude by the gravimetric sensor near the second aircraft contaminant collector

is higher than the target level, by an amount proportionate to how much higher the signal magnitude is above the target level, to maintain the signal magnitude at the target level.

3. A method for determining and classifying by type aircraft air contaminants, the method comprising:

(a) passing aircraft air through an inlet of an aircraft air contaminant analyzer and through a flow-through heater block and a first valve, wherein the flow-through heater block is arranged to control temperature of the aircraft air passing through the flow-through heater block;

passing a sample of the aircraft air through the aircraft air contaminant analyzer and through at least one aircraft air contaminant collector and a second valve along a first sample flow path at a first sample flow rate and/or at a first sample flow duration, while passing another sample of aircraft air through the aircraft air contaminant analyzer and through a bypass section and a third valve along a second sample flow path bypassing the at least one aircraft air contaminant collector at a second sample flow rate and/or at a second sample flow duration,

the at least one aircraft air contaminant collector comprising:

(i) a microporous medium comprising microporous flow-through channels arranged across the first sample flow path, the microporous medium having a chemoselective coating; and,

(ii) a thin film resistive heater, capable of heating to a temperature that vaporizes captured air contaminants, wherein the heater is in contact with the microporous medium;

the aircraft air contaminant analyzer also including a gravimetric sensor arranged to generate a proportionate resonant frequency response when air contaminant mass is added to or removed from the gravimetric sensor, for classifying air contaminant type; and

wherein the bypass section comprises a bypass channel, the bypass channel including the second sample flow path;

(a') the aircraft air contaminant analyzer further comprising:

a pump generating flow along the first sample flow path and along the second sample flow path;

a pressure sensor arranged between the first valve, the second valve, and the third valve; and

a temperature sensor arranged to measure temperature in the flow-through heater block;

(b) controlling the first sample flow rate and/or the first sample flow duration through the at least one aircraft air contaminant collector along the first sample flow path while independently controlling the second sample flow rate and/or the second sample flow duration through the bypass section along the second sample flow path, wherein the first sample flow rate and/or the first sample flow duration is/are initially set at a low value for a first measurement of response signal magnitude;

(c) capturing air contaminants by the microporous medium;

(d) closing the first valve and the second valve and when a desired pressure is reached based upon a signal from the pressure sensor, closing the third valve and discontinuing passing aircraft air through

the at least one aircraft air contaminant collector along the first sample flow path;

(e) heating the microporous medium to a temperature sufficient to vaporize the captured air contaminants and desorb the captured air contaminants;

(f) receiving the desorbed air contaminants on the gravimetric sensor arranged to generate a proportionate resonant frequency response when air contaminant mass is added to or removed from the gravimetric sensor;

(g) measuring the proportionate resonant frequency response generated by the gravimetric sensor as the air contaminant is added to and removed from the gravimetric sensor, determining signal magnitude from the proportionate resonant frequency response, determining the air contaminant concentration, classifying the air contaminant type, and outputting the determined air contaminant concentration and classified air contaminant type;

(h) executing an air contaminant recognition program stored upon a computer-readable medium, including calculating air contaminant concentration using the measured signal magnitudes and first sample flow rates and the first sample flow durations along the first sample flow path;

(i) opening the first valve, the second valve, and the third valve;

(j) determining an upper threshold and a lower threshold for the signal magnitude for the contaminant type, and continuously repeating (b)-(i) and measuring response signal magnitudes and adjusting the first sample flow rate and/or the first sample flow duration based upon the previously measured signal magnitude such that

the first sample flow rate and/or the first sample flow duration is increased when the signal magnitude is lower than the lower threshold, to a next pre-determined higher sensitivity level, to maintain the signal magnitude between the upper threshold and the lower threshold,

and

the first sample flow rate and/or the first sample flow duration is decreased when signal magnitude is higher than the upper threshold, to a next pre-determined lower sensitivity level, to maintain the signal magnitude between the upper threshold and the lower threshold;

(k) executing the air contaminant recognition program stored upon the computer-readable medium, including calculating air contaminant concentration using the measured signal magnitudes and first sample flow rates and the first sample flow durations along the first sample flow path; and,

(l) outputting the determined air contaminant concentration and air contaminant type.

4. A method for determining and classifying by type aircraft air contaminants, the method comprising:

(a) passing aircraft air through an inlet of an aircraft air contaminant analyzer and through a flow-through heater block and a first valve, wherein the flow-through heater block is arranged to control temperature of the aircraft air passing through the flow-through heater block;

(a') the aircraft air contaminant analyzer comprising:

at least a first aircraft air contaminant collector and a second aircraft air contaminant collector;

a first sample flow path including a first sample portion flow path and a second sample portion flow path;

wherein the first aircraft air contaminant collector is arranged along the first sample portion flow path, the aircraft air contaminant analyzer including a first adjustable flow controller communicating with the first sample portion flow path;

and

the second aircraft air contaminant collector is arranged along the second sample portion flow path, the aircraft air contaminant analyzer including a second adjustable flow controller communicating with the second sample portion flow path;

wherein the aircraft air contaminant analyzer includes a second valve arranged downstream of the first sample portion flow path and the second sample portion flow path;

and,

a bypass section providing a bypass sample flow path bypassing the first aircraft air contaminant collector and the first sample portion flow path, and bypassing the second aircraft air contaminant collector and the second sample portion flow path, the bypass section comprising a bypass channel, the bypass channel including the bypass sample flow path;

wherein the aircraft air contaminant analyzer includes a third valve arranged downstream of the bypass sample flow path;

the first aircraft air contaminant collector and the second aircraft air contaminant collector each separately comprising:

(i) a microporous medium comprising microporous flow through channels arranged across the sample portion flow path, the microporous medium having a chemoselective coating; and,

(ii) a thin film resistive heater, capable of heating to a temperature that vaporizes captured air contaminants, wherein the heater is in contact with the microporous medium;

the aircraft air contaminant analyzer also including a gravimetric sensor arranged near each respective microporous medium to generate a proportionate resonant frequency response when air contaminant mass is added to or removed from each gravimetric sensor, for classifying air contaminant type;

(a”) the aircraft air contaminant analyzer further comprising:

a pump generating flow along the first sample portion flow path, the second sample portion flow path, and along the bypass sample flow path;

a pressure sensor arranged between the first valve, the second valve, and the third valve; and

a temperature sensor arranged to measure temperature in the flow through heater block;

(b) passing a first sample of the aircraft air through the aircraft air contaminant analyzer and through the first and second aircraft air contaminant collectors and the second valve along the first sample flow path at a first sample flow rate and at a first sample flow duration, including passing a first sample portion of the first sample through the first aircraft air contaminant collector and passing a second sample portion of the first sample through the second aircraft air contaminant collector;

passing the first sample portion of the aircraft air along the first sample portion flow path at a first sample portion flow rate and at a first sample portion flow duration, and passing the second sample portion of the aircraft air along the second sample portion flow path at a second sample portion flow rate and at a second sample portion flow duration, wherein the first sample portion flow duration equals the second sample portion flow duration;

while passing another sample of aircraft air through the aircraft air contaminant analyzer and through the bypass section and a third valve along the bypass sample flow path bypassing the first and second aircraft air contaminant collectors at a bypass sample flow rate and at a bypass sample flow duration;

(b') adjusting the first sample portion flow rate and the second sample portion flow rate

such that

the first sample portion flow rate is decreased by adjusting the first adjustable flow controller when a measured signal magnitude of the first aircraft contaminant collector is higher than a measured signal magnitude of the second aircraft contaminant collector; and

the second sample portion flow rate is decreased by adjusting the second adjustable flow controller when a measured signal magnitude of the second aircraft contaminant collector is higher than a measured signal magnitude of the first aircraft contaminant collector;

(c) controlling the first sample flow rate and/or the first sample flow duration along the first sample portion flow path;

while independently controlling the bypass sample flow rate and/or the bypass sample flow duration through the bypass section along the bypass sample flow path;

wherein the first sample flow rate and/or the first sample flow duration are initially set at a low value for initial measurements of response signal magnitudes;

(d) capturing air contaminants by each microporous medium;

(e) closing the first valve and the second valve and when a desired pressure is reached based upon a signal from the pressure sensor, closing the third valve and discontinuing passing aircraft air through the first and second aircraft air contaminant collector along the first sample portion flow path and the second sample portion flow path;

(f) heating each microporous medium to a temperature sufficient to vaporize the captured air contaminants and desorb the captured air contaminants;

(g) receiving the desorbed air contaminants on each gravimetric sensor arranged to generate a proportionate resonant frequency response when air contaminant mass is added to or removed from the gravimetric sensor;

(h) measuring the proportionate resonant frequency response generated by each gravimetric sensor as the air contaminant is added to and removed from each gravimetric sensor, determining signal magnitude from the proportionate resonant frequency response, determining the air contaminant concentration, classifying the air contaminant type, and outputting the determined air contaminant concentrations and classified air contaminant types;

(i) executing an air contaminant recognition program stored upon a computer readable medium, including calculating air contaminant concentrations using the measured signal magnitudes and the first sample flow rates and the first sample portion flow duration along the first sample flow path;

(j) opening the first valve, the second valve, and the third valve;

(k) determining an upper threshold and a lower threshold for the signal magnitude for the contaminant type, and continuously repeating (d)-(j) and measuring response signal magnitudes and adjusting the first sample portion flow rate and/or the first sample portion flow duration such that

the first sample flow rate and/or the first sample flow duration is increased when the signal magnitude of either

(iv) an average of the previously measured signal magnitudes by the gravimetric sensors near the first aircraft contaminant collector and near the second aircraft contaminant collector; or

(v) the previously measured signal magnitude by the gravimetric sensor near first aircraft contaminant collector; or

(vi) the previously measured signal magnitude by the gravimetric sensor near the second aircraft contaminant collector

is lower than the lower threshold, to the next pre-determined higher sensitivity level, to maintain the signal magnitude at between the lower threshold and the upper threshold; and

the first sample portion flow rate and/or the first sample portion flow duration is decreased when the measured signal magnitude of either

(vii) the average of the previously measured signal magnitudes by the gravimetric sensors near the first aircraft contaminant collector and near the second aircraft contaminant collector; or

(viii) the previously measured signal magnitude by the gravimetric sensor near first aircraft contaminant collector; or

(ix) the previously measured signal magnitude by the gravimetric sensor near the second aircraft contaminant collector

is higher than the than the upper threshold, to the next pre-determined lower sensitivity level, to maintain the signal magnitude to maintain the signal magnitude between the upper threshold and the lower threshold.

5. The method of claim 1 or 3, wherein (d) includes stopping operation of the pump.

6. The method of claim 2 or 4, wherein (e) includes stopping operation of the pump.

7. The method of any one of claims 1-6, wherein the air contaminants comprise aerosols.

8. The method of any one of claims 1-7, wherein the air contaminants comprise particulates.

9. The method of any one of claims 1-8, wherein the air contaminants comprise gases.

10. An aircraft air contaminant analyzer comprising:

(a) at least one aircraft air contaminant collector comprising:

(i) a microporous medium comprising microporous flow-through channels and a chemoselective coating, wherein the microporous medium remains functional and desorbs captured air contaminants while being heated for a controlled time period, the at least one aircraft contaminant collector providing a first sample flow path, wherein the microporous medium is arranged across the first sample flow path;

(ii) a thin film resistive heater, capable of heating to a temperature that vaporizes captured air contaminants, wherein the heater is in contact with the microporous medium;

(b) a bypass section, comprising a bypass channel, the bypass channel including a second sample flow path, the bypass channel bypassing the at least one aircraft air contaminant collector;

(c) a first substrate, having a top surface and a bottom surface; wherein the at least one contaminant collector is associated with the first substrate, the microporous medium and heater being thermally insulated from the first substrate;

(d) a gravimetric sensor arranged to generate a proportionate resonant frequency response when air contaminant mass is added to or removed from the gravimetric sensor, for classifying air contaminant type;

(e) a second substrate, having a top surface and a bottom surface; wherein the gravimetric sensor is associated with the top surface of the second substrate, the gravimetric sensor being separated from the contaminant collector by a constant distance, the gravimetric sensor being arranged to receive air contaminants desorbed from the microporous medium when the microporous medium is heated;

(f) a support comprising a top surface and a bottom surface, the support comprising a common inlet port passing through the top surface and the bottom surface of the support, wherein the bottom surface of the second substrate is associated with the top surface of the support;

(g) the aircraft air contaminant analyzer further comprising:

an aircraft air contaminant inlet port; a flow-through heater block; and a first valve, arranged upstream of the common inlet port;

a second valve, downstream of the at least one aircraft air contaminant collector, and arranged along the first sample flow path;

a third valve arranged along the second sample flow path;

a pump arranged to generate flow along the first sample flow path and along the second sample flow path;

a pressure sensor arranged between the first valve, the second valve, and the third valve; and

a temperature sensor arranged to measure temperature in the flow-through heater block;

(h) a resonant frequency measurement device, arranged to measure the proportionate resonant frequency response generated by the gravimetric sensor as the air contaminant is added to and removed from the gravimetric sensor;

(i) a computer readable medium bearing an air contaminant recognition program and calibration data; and,

(j) a processor configured:

to execute the air contaminant recognition program, the contaminant recognition program including a module configured to classify the air contaminant by type, and to measure response signal magnitudes from the proportionate resonant frequency response generated by the gravimetric sensor, and a module programmed to use

the calibration data for comparison with the signal magnitude to calculate air contaminant concentration; and,

to execute a sensitivity control program, the sensitivity control program including a module configured to maintain the signal magnitude at a predetermined target level or within a predetermined upper threshold and a predetermined lower threshold, by controlling the first valve, the second valve, and/or the third valve and/or the pump to:

increase the first sample flow rates and/or the first sample flow durations when the signal magnitude is less than the predetermined target level or the predetermined lower threshold;

decrease the first sample flow rates and/or the first sample flow durations when the proportionate resonant frequency response is greater than the predetermined target level or the predetermined upper threshold.

11. The aircraft air contaminant analyzer of claim 10, further comprising an additional aircraft air contaminant collector such that the analyzer comprises:

a first aircraft air contaminant collector and a second aircraft air contaminant collector;

the first sample flow path including a first sample portion flow path and a second sample portion flow path;

wherein the first aircraft air contaminant collector is arranged along the first sample portion flow path, the aircraft air contaminant analyzer including a first adjustable flow controller communicating with the first sample portion flow path;

and

the second aircraft air contaminant collector is arranged along the second sample portion flow path, the aircraft air contaminant analyzer including a second adjustable flow controller communicating with the second sample portion flow path;

wherein the aircraft air contaminant analyzer includes the second valve arranged downstream of the first sample portion flow path and the second sample portion flow path

and,

wherein the bypass section providing the second sample flow path bypasses the first aircraft air contaminant collector and the first sample portion flow path, and bypasses the second aircraft air contaminant collector and the second sample portion flow path and wherein the third valve is arranged downstream of the second sample flow path;

the first aircraft air contaminant collector and the second aircraft air contaminant collector each separately comprising:

(i) a microporous medium comprising microporous flow through channels arranged across the sample portion flow path, the microporous medium having a chemoselective coating; and,

(ii) a thin film resistive heater, capable of heating to a temperature that vaporizes captured air contaminants, wherein the heater is in contact with the microporous medium;

the aircraft air contaminant analyzer also including a gravimetric sensor arranged near each respective aircraft air contaminant collector to generate a proportionate resonant frequency response when air contaminant mass is added to or removed from the respective gravimetric sensor, for classifying air contaminant type;

the pump generating flow along the first sample portion flow path, the second sample portion flow path, and along the second sample flow path;

wherein the air contaminant recognition program includes a module configured to measure response signal magnitudes from the proportionate resonant frequency responses generated by the gravimetric sensors near each respective collector, and a module to calculate air contaminant concentrations using one or both signal magnitudes,

wherein the sensitivity control program includes a module configured to maintain either

an average of the previously measured signal magnitudes by the gravimetric sensors near the first aircraft contaminant collector and near the second aircraft contaminant collector; or

the previously measured signal magnitude of the gravimetric sensor near the first aircraft contaminant collector; or

the previously measured signal magnitude of the gravimetric sensor near the second aircraft contaminant collector;

at a predetermined target level or within a predetermined upper threshold and a predetermined lower threshold, by controlling the first valve, the second valve, and/or the third valve and/or the pump to:

increase the first sample flow rates and/or the first sample flow durations when the signal magnitude is less than the predetermined target level or the predetermined lower threshold;

decrease the first sample flow rates and/or the first sample flow durations when the signal magnitude is greater than the predetermined target level or the predetermined upper threshold.