

CLAIMS

What is claimed is:

1. A volumetric sampling apparatus comprising:

5 a unitary body comprising an inwardly spiraling channel structure, wherein the channel structure comprises an inlet port and an outlet port, and wherein the channel structure is open at a skin-facing surface of the unitary body;

 wherein the inlet port is open to ambient air; and wherein the outlet port is configured for coupling to one or both of a negative pressure source and a gas composition analyzer.

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2. The volumetric sampling apparatus of claim 1, further comprising a gas filter positioned in or proximal to the inlet port, the gas filter being configured to reduce volatile compounds contaminants from entering the channel structure by way of the inlet port when the channel structure is positioned on a patient's skin.

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3. The volumetric sampling apparatus of claim 1 or 2, wherein the channel structure forms a continuous curve between the inlet port and the outlet port.

4. The volumetric sampling apparatus of any one of claims 1 to 3, wherein the skin-facing surface comprises a conformal curvature configured for a sealing-contact with a patient's skin.

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5. The volumetric sampling apparatus of claim 4, wherein the conformal curvature is concave.

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6. The volumetric sampling apparatus of any one of claims 1 to 5, further comprising a heating element configured to stimulate transdermal diffusion of volatile compounds from a patient's skin.

7. The volumetric sampling apparatus of any one of claims 1 to 6, further comprising a heating element configured to generate a temperature gradient along the channel structure between the inlet port and the outlet port.

5 8. The volumetric sampling apparatus according to any one of claims 1 to 7, wherein the channel structure has a consistent width from the inlet port to the outlet port.

 9. The volumetric sampling apparatus according to any one of claims 1 to 8, wherein the volumetric sampling apparatus is configured for operatively coupling to an inert gas supply
10 through a coupling connected to the inlet port.

 10. A blood glucose level measurement method comprising:
 mounting the volumetric sampling apparatus of any one of claims 1 to 9 on a patient's skin to form a gas seal, the skin-facing surface being in contact with the patient's skin;
15 actuating a gas flow through the structure between an inlet port and an outlet port of the unitary body by applying negative pressure at the outlet port to draw ambient air from the inlet port through the channel structure; and
 measuring volatile compounds in gases collected at the outlet port.

20 11. The blood glucose level measurement method of claim 10, further comprising applying thermal heating to the unitary body.

 12. The blood glucose level measurement method of claim 10 or 11, further comprising:
 measuring a baseline level of the volatile compounds in ambient air; and
25 applying the baseline level to adjust a measure of the volatile compounds in the gases collected at the outlet port.