providing a potentially non-invasive form of blood glucose level monitoring, the system requires a liquid capture system.

[0005] Another example of a potential non-invasive blood glucose monitoring technology is a breath analyzer 100 as depicted in FIG. 1 and FIG. 2. The breath analyzer 100 is a wrist mounted sampling device, similar to a smart watch, that includes a set of laterally positioned gas collection ports 102 intended to capture volatile organic compounds (VOC) and semi-volatile organic compounds (SVOC). The breath analyzer 100 utilizes an internal gas detector.

SUMMARY

[0006] This disclosure relates to devices for volumetric sampling that include a skin-facing surface, an inlet port, and an outlet port, with a structure that is open at the skin-facing surface, such as a channel structure forming a gas flow path, such as a continuous curve between the inlet port and the outlet port. Such devices may be realized as wearables, such as smartwatches or fitness trackers or may be part of such wearables.

[0006a] According to an aspect of the present disclosure, there is provided a volumetric sampling apparatus comprising:

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 and is enclosed by a top 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.

[0007] This disclosure further relates to a blood glucose level measurement method whereby a unitary body is mounted on a patient's skin to form a gas seal, the unitary body comprising a skin-facing surface in contact with the patient's skin and a top surface enclosing a structure, such as a channel structure open to the patient's skin at the skin-facing surface. A gas flow is then actuated through the structure between an inlet port and an outlet port of the unitary body.

[0008] This disclosure further relates to devices for volumetric sampling that include a unitary body with an inward spiral channel structure. The channel structure includes an inlet port and an outlet port and is open at a skin-facing surface of the unitary body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] To easily identify the discussion of any particular element or act, the most significant digit or digits in a reference number refer to the figure number in which that element is first introduced.

[0010] FIG. 1 depicts a prior art breath analyzer 100 in one aspect.

[0011] FIG. 2 depicts the prior art breath analyzer 100 in another aspect.

CLAIMS

What is claimed is:

1. A volumetric sampling apparatus comprising:

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 and is enclosed by a top 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.

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.

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.

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

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.

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 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;

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.

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

applying the baseline level to adjust a measure of the volatile compounds in the gases collected at the outlet port.