in FIG. 26 is implemented based on the structure of the output unit 1720 of FIG. 17.

[0182] FIG. 27 illustrates a block diagram of a measurement device according to the present disclosure.

[0183] Hereinafter, a sensor measurement device 2700 will be described as an example of the measurement device. The sensor measurement device 2700 may be implemented as a computing device that performs a computing function.

[0184] Referring to FIG. 27, the sensor measurement device 2700 includes a voltage application unit 2702 and a measurement unit 2704. The sensor measurement device 2700 may be implemented in various forms, and FIGS. 17 to 26 may be referred to as examples. A sensor 2710 may output different currents or resistances according to the type of specimen. Various types of sensors 2710 may be used in the present embodiment. In another embodiment, a graphene-based sensor may be used to increase the sensitivity of the sensor. FIGS. 1 to 15 and 17 to 26 may be referred to as examples of graphene-based sensors.

[0185] A voltage application unit 2702 applies at least one voltage to the sensor 2710 within a predefined voltage range. For example, the voltage application unit 2702 inputs a voltage between 0 and 2 V to the sensor 2710 at regular intervals (e.g., 0.1 V intervals). According to embodiments, the voltage range and the voltage application interval may be variously modified.

[0186] The measurement unit 2704 measures resistance or current of the sensor 2710 according to the application of voltage. The measurement unit 2704 detects the resistance or current of the sensor for each voltage. For example, the measurement unit 2704 detects the measurement value of the resistance or current of the sensor 2710 according to the application of voltage before a specimen is applied, and detects the measurement value of the resistance or current of the sensor 2710 according to the application of voltage after the specimen is applied. A measurement method using the sensor measurement device 2700 will be described later with reference to FIGS. 30 to 33.

[0187] The measurement unit 2704 may display a measurement result through a screen interface, output whether a specimen is recognized through a sound, or transmit the measurement result to an external device through a wired or wireless communication network. The type of information displayed or transmitted by the measurement unit 2704 may be variously modified according to embodiments.

[0188] FIGS. 28 to 29 illustrate implementation examples of a measurement device according to the present disclosure.

[0189] Referring to FIG. 28, a measurement device 2800 may be implemented in a small portable size. An insertion hole 2810 into which a diagnostic strip is insertable is provided in one side of the measurement device 2800. The diagnostic strip has a long and thin rod shape, and the

diagnostic strip having a specimen smeared thereon may be inserted into the insertion hole 2810 of the measurement device 2800.

[0190] As an embodiment, the measurement device 2800 may transmit a measurement value of a graphene-based sensor to an external device such as a smartphone. In this regard, an example of using the measurement device will be described later with reference to FIG. 34. In another embodiment, the measurement device 2800 may further include an internal circuit capable of analyzing the measurement value by the graphene-based sensor. This will be described later with reference to FIGS. 35 to 36. In addition, the measurement device 2800 may further include a display capable of displaying analysis results or a communication unit capable of transmitting analysis results to the outside through a wired or wireless network.

[0191] Referring to FIG. 29, a measurement device 2900 includes a plurality of insertion holes 2910 into which a plurality of diagnostic strips can be inserted, and a plurality of graphene-based sensors capable of simultaneously analyzing a plurality of diagnostic strips inserted through the insertion holes 2910. The plurality of graphene-based sensors included in the measurement device 2900 may exist separately in each insertion hole 2910 or may exist as the sensor array structure described above.

[0192] The measurement device 2900 may include an internal circuit capable of analyzing output values of a plurality of graphene-based sensors. This will be described later with reference to FIGS. 35 to 36. The measurement device 2900 may further include a display unit configured to display analysis results, and a communication unit capable of transmitting analysis results to an external device.

[0193] In another embodiment, quantitative analysis of a specimen may be performed using the measurement device 2800 or 2900 of FIG. 28 or 29. As shown in FIG. 28, when a single insertion hole 2810 is included in the measurement device 2800, a plurality of diagnostic strips containing a plurality of standard samples of different concentrations and a diagnostic strip of a specimen are sequentially inserted into the insertion hole 2810 of the measurement device 2800 to obtain a measurement value by the graphene-based sensor of each diagnostic strip. Alternatively, when a plurality of insertion holes 2910 are included in the measurement device 2900 as shown in FIG. 29, a plurality of diagnostic strips containing a plurality of standard samples of different concentrations and a diagnostic strip of a specimen are simultaneously inserted into the insertions holes 2910 of the measurement device 2900 to obtain measurement values by the graphene-based sensors of the plurality of diagnostic strips all at once. The measurement device 2800 or 2900 identifies a change in the measurement values (e.g., change in current or voltage) by the graphene-based sensor over time for standard samples having different concentrations. In addition, the measurement device 2800 or 2900 may identify the concentration or intensity of a specimen by