**Supplementary Information**

Layer-by-Layer Deposited Multifunctional PDAC/rGO composite-based sensors

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**Supplementary figures:**



**Figure S1.** (a) Schematic representation of the screen printed Ag electrode used for the LbL deposition of PDAC/GO bi-layers; (b) Protocol for the LbL deposition of the PDAC/GO bi-layers.



**Figure S2.** The block and connection diagram of the humidity measurement system.



**Figure S3.** Temperature measurement (a) sensitivity curve as the function of the number of the PDAC/rGO layers; (b) response time as the function of the number of the PDAC/rGO layers; (c) recovery time as the function of the number of the PDAC/rGO layers; (d) Long-term stability curves for the temperature measurements using PDAC/rGO-8L sensor.



**Figure S4.** (a) Sensitivity of the response as response curve of different layers for the relative humidity measurements; (b) Long-term stability curves for the relative humidity measurements using PDAC/rGO-8L sensor.

**Table S1.** Information of the detected real samples.

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| **Sample** | **Type** | **Storage temp.** | **Storage time** |
| Wine | Rot Tempranillo 2015 Trocken, original liquid (Alcohol: 10.5%) | Room temperature | Newly opened |
| Coffee | Saturated brewed solution(0.2020 g/ml) | Room temperature | Newly opened |
| Fresh Beef | Ground meat (10 g) | 8 °C | 2 days |
| Spoiled Beef | Ground meat (10 g) | 8 °C | 10 days |
| Fresh Pork | Ground meat (10 g) | 8 °C | 2 days |
| Spoiled Pork | Ground meat (10 g) | 8 °C | 10 days |