Supporting information

Wearable respiratory sensors for non-invasive healthcare monitoring: applications and intelligent technologies

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Table S1. Comparison of various types of sensors in terms of target gas, sensitivity, detection limit, response/recovery time, mechanical flexibility, cost, and integrability.

Types of sensors	Target gas	Sensitivity	LOD	τ_{res}/τ_{rec}	Flexibility	Integrability / Cost
Chemiresistive sensors	VOCs; NH_3, NO, etc.	1-10^2/10 ppm	ppt-ppb	10-10^2 s	Good	Low cost and easy integrability; Easily mass-produced
Electrochemical sensors	Acetone, NH_3, NO, H_2O_2, etc.	nA–μA / ppm	ppt-ppb	< 60 s	Medium	High cost and complex integrability
Optical sensors	H_2S, NO_2, etc.	---	ppb-ppm	---	Poor	High cost and complex integrability
Humidity sensors	Humidity	0.1-10^2%/%RH	<1% RH	< 60 s	Good	Low cost and easy integrability
Pressure sensors	Acetone, NH_3, NO, etc.	1-10^3 Hz/ppm	ppb	<200 s	Poor	High cost and complex integrability

Table S2. Comparison of advantages and disadvantages of the four material categories for practical applicability in real respiratory environments.

Materials	**Metal oxides**	**Carbon materials**	**Conductive polymers**	**Metal chalcogenides**
Work temperature	High (150-500℃)	Room temperature	Room temperature	Room temperature to 200℃
Selectivity	Poor	Poor	Excellent to basic gas	Medium
Sensitivity	High	Low	Low	Medium
Stability	Excellent	Medium	Poor	Poor
Target gas	Wide range of gases	NO_x, NH_3, etc.	NH_3, humidity, etc.	NO_2, NH_3, etc.
Synthetic process	Easy	Medium	Medium	Complicated

Table S3. Evaluation of various energy sources for self-powered systems.

Power source	**Power density**	**Energy source**	**Wearability**
Solar cells	mW/cm^2	Light	Poor
Piezoelectric nanogenerators	μW-W/cm^2	Repeatedly applying and releasing force	Good
Triboelectric nanogenerators	μW-mW/cm^2	Body movement	Excellent
Thermoelectric generator	μW/cm^2	Heat	Medium