Supplementary Information

for

An Active Self-Driven Piezoelectric Sensor Enabling Real-Time Respiration Monitoring

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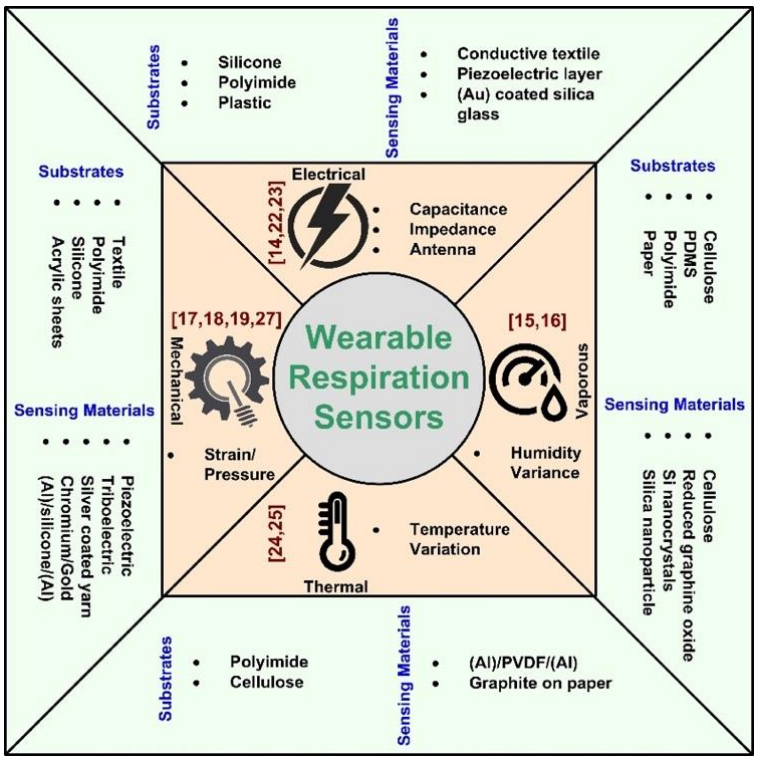
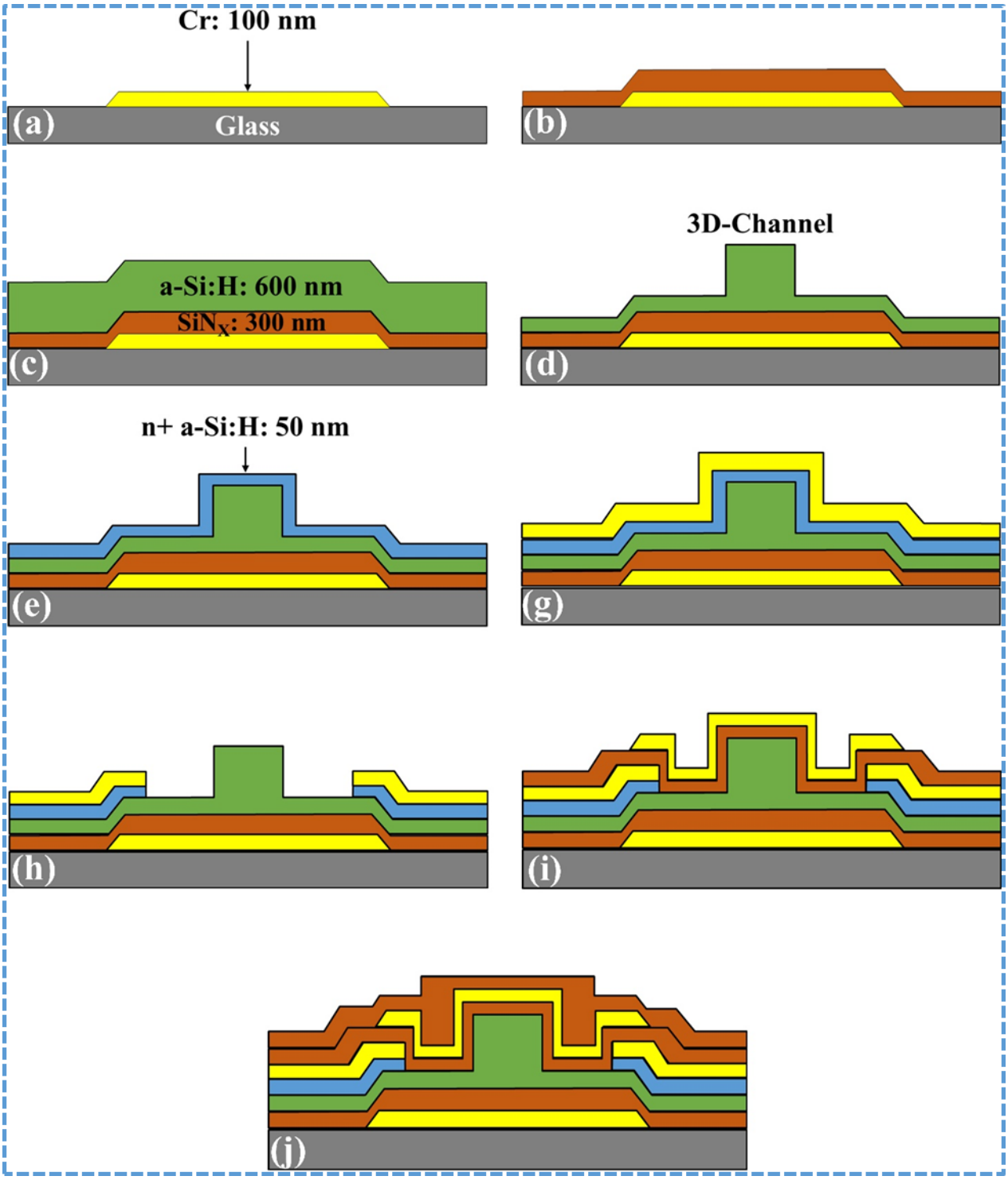
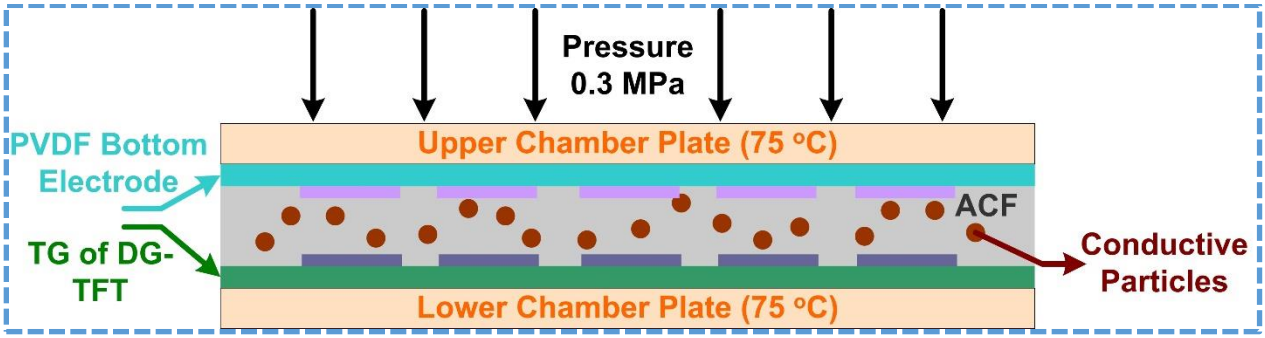


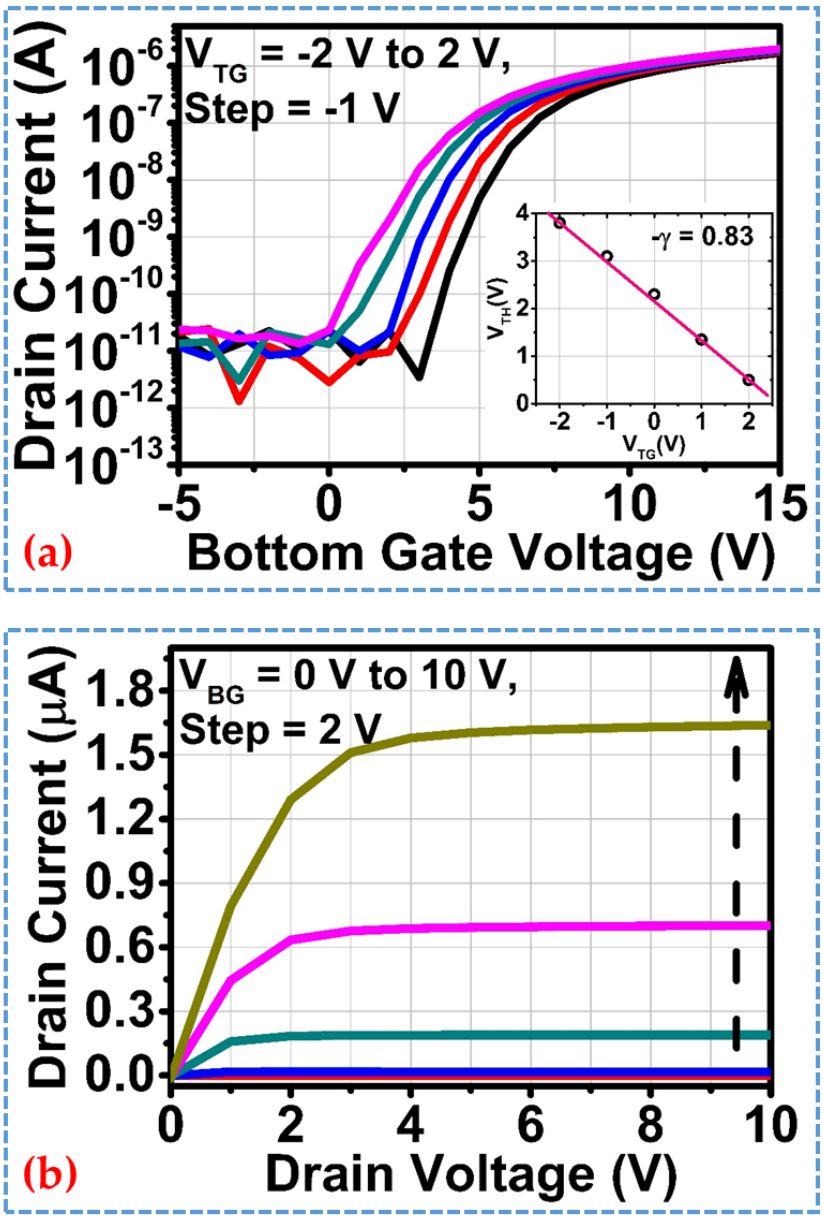
Supplementary Figure 1. Summary of recently-developed wearable respiration rate sensors. The main categories of signal transduction are based on electrical, mechanical, thermal and humidity stimuli.



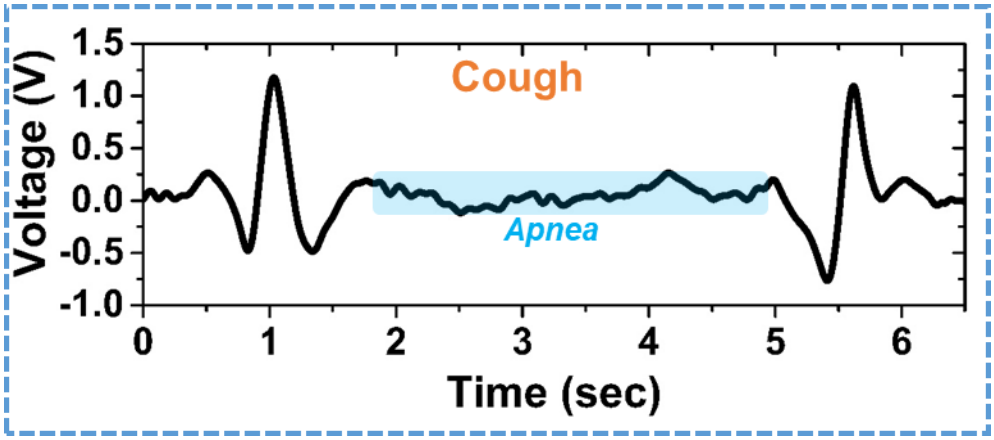
Supplementary Figure 2. Device layouts and fabrication steps of 3-D FIN-shaped a-Si:H dual-gate thin film transistor (DG-TFT) on a glass substrate. Schematic illustration of fabrication steps of DG-TFT.



Supplementary Figure 3. Device layout and integration process of piezoelectric transducer film and 3-D FIN-shaped a-Si:H dual-gate thin film transistor (DG-TFT) on a glass substrate. Cross-sectional schematic illustration of PTGTFT fabrication by the integration of PVDF film and 3-D FIN-shaped DG-TFT.



Supplementary Figure 4. Electrical characterization of 3-D FIN-shaped a-Si:H dual-gate thin film transistor (DG-TFT) on a glass substrate. (a) Transfer characteristics, inset shows value of the extracted dependence parameter (γ) and **(b)** Output characteristics.



Supplementary Figure 5. Electric response of the PTGTFT to successive mechanical motions (cough and holding breath).

Supplementary Table 1. The averaged respiration rate of a single subject over multiple days for normal and moderate breathing acquired from the PTGTFT at two peripheral points (neck and chest) and ECG-derived-respiration (EDR).

Measurement Day #	Normal Breathing			Moderate Breathing		
	Neck Position	Chest Position	EDR	Neck Position	Chest Position	EDR
1	17 ± 2.6	17.5 ± 2.5	18	21 ± 2.5	20.5 ± 1.5	22
2	14.6 ± 1.06	14 ± 1.5	15.5	19 ± 1.1	20.7 ± 1.3	20
3	16.5 ± 2.3	16.5 ± 1.6	16.5	19 ± 0.5	19 ± 0.9	20
4	17.3 ± 0.9	17 ± 1.2	18.5	22 ± 2.3	21 ± 1.5	19.5
5	14.5 ± 2.1	15 ± 1.1	15.5	18 ± 1.4	17 ± 2.1	17.5
6	16 ± 2.2	16 ± 1.5	17	20 ± 0.9	20 ± 1.1	20