

Solution-processed and High-performance Ionic-paper Gated Field-effect Transistors from Two-dimensional Layered Semiconductor Nanosheets with High Thermal Resolution

Guokeng Liu ^{a,b}, Chunyang Jin ^{a,b}, Binlai Hu ^{a,b}, Lihua Zhang ^{a,b}, Guozheng Zeng ^{a,b}, Haihua Xu ^{a,b*}

^aDepartment of Biomedical and Engineering, School of Medicine, Shenzhen University, Shenzhen, China.

^bGuangdong Key Laboratory for Biomedical Measurements and Ultrasound Imaging, Shenzhen, China.

*Corresponding E-mail address: hwxu@szu.edu.cn

Support Information

1. Scanning electron microscope (SEM) of the WSe₂ LSNs

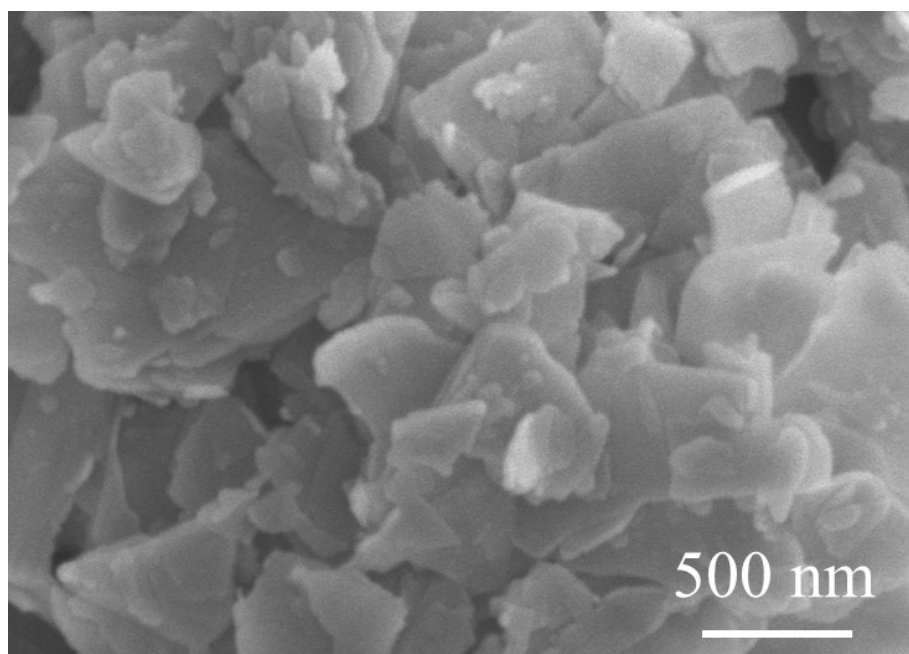


Fig. S1 The SEM image of the WSe₂ LSNs obtained from liquid-phase exfoliation.

2. The EDL capacitance of the “*i*-gel” film

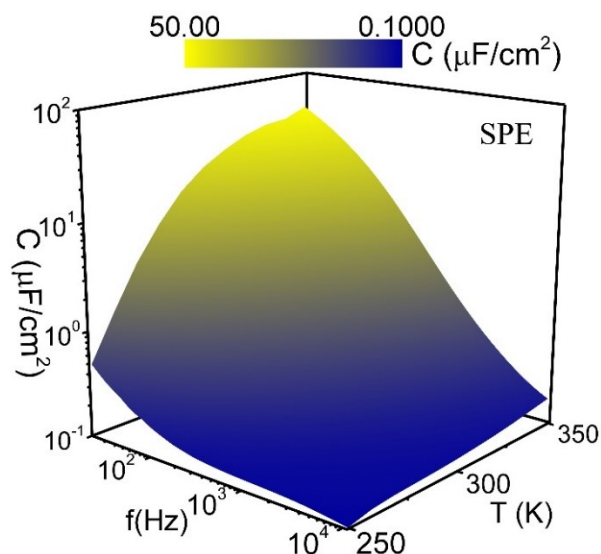


Fig. S2 Contour map of the temperature-dependent EDL capacitance as a function of frequency at the *i*-gel/LSN interface.

3. Off-current of the *i*-paper gated MoS₂ FETs

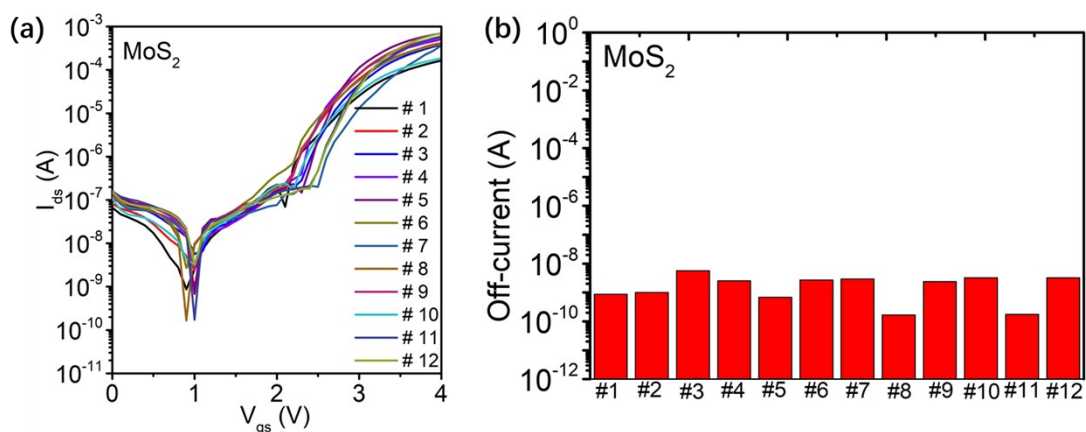


Fig. S3 (a) Transfer characteristics and (b) the off-currents of the 12 *i*-paper gated MoS₂ FETs.

4. Off-current of the *i*-paper gated MoS₂ FETs

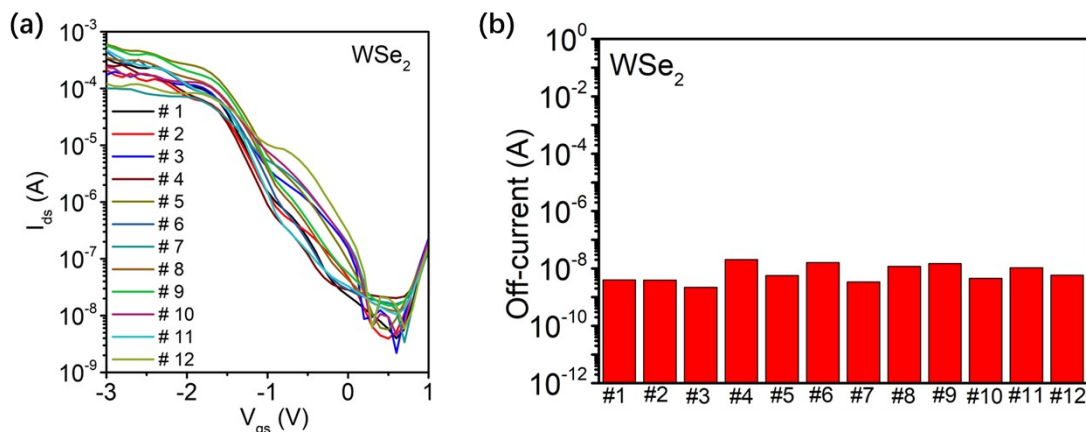


Fig. S4 (a) Transfer characteristics and (b) the off-currents of the 12 *i*-paper gated WSe₂ FETs.

5. Operation stability of the thermal sensor

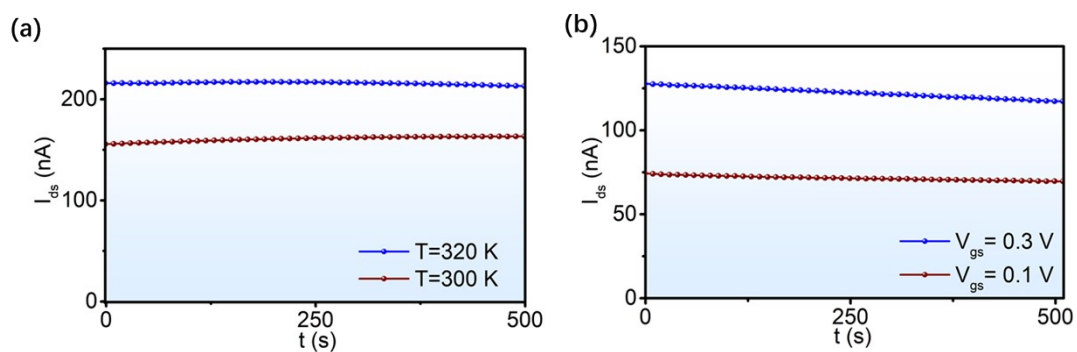


Fig. S5 Real-time I_{ds} curves of the n-type *i*-gel gated LSN FET at (a) constant temperatures ($T=320$ K and 300 K) and (b) constant biases ($V_{gs}=0.3$ V and 0.1 V).

6. Transient response of the thermal sensor

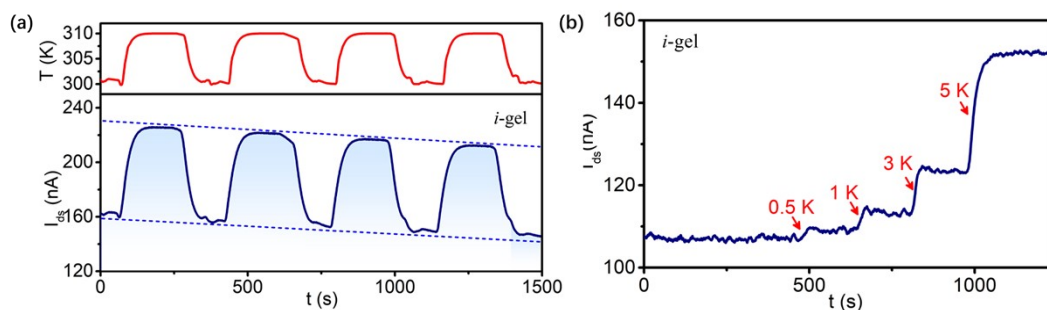


Fig. S6 (a) Transient response of the thermal sensor using the n-type *i*-gel gated LSN FET as switching the temperature from 300 K to 310 K. (b) Real-time recording of I_{ds} at $V_{gs}=0.1$ V, measured by increasing different temperatures.