

## Supporting Information

### Facile and reversible carrier-type manipulation of layered MoTe<sub>2</sub> toward long-term stable electronics

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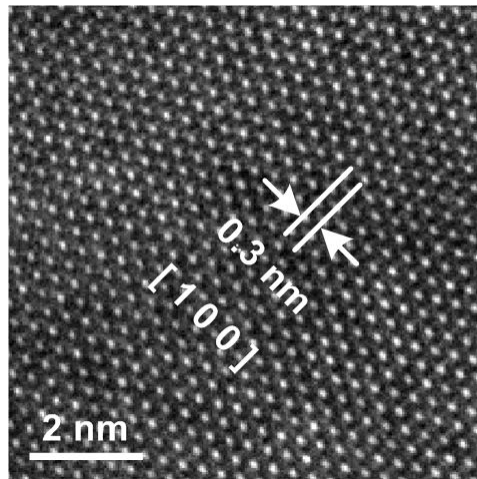
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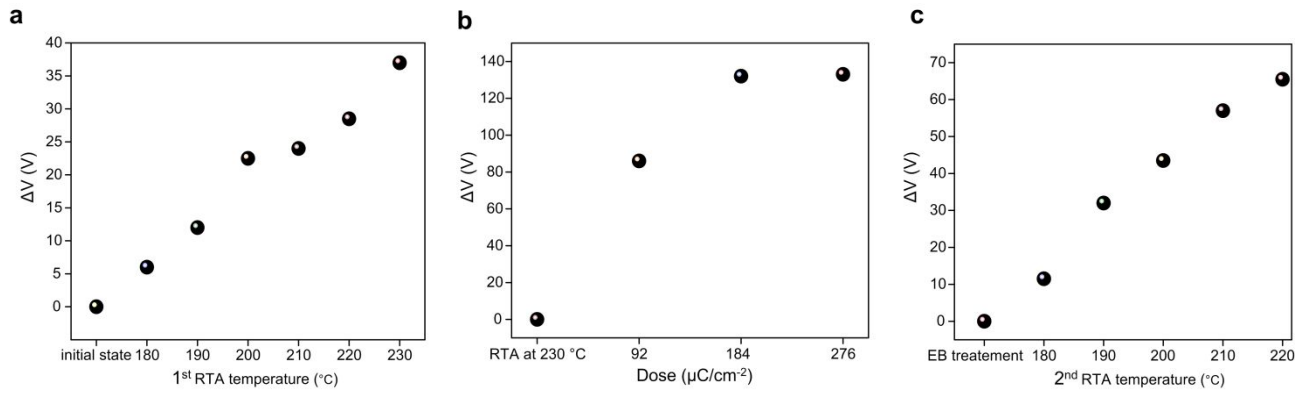
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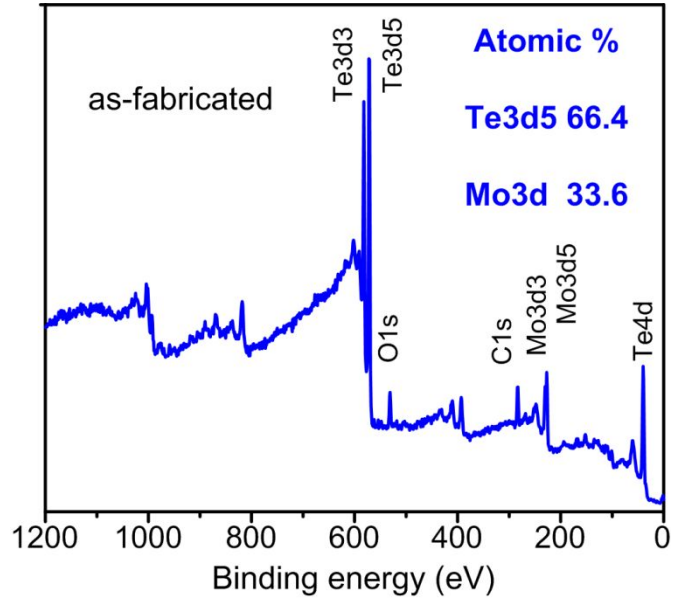
To explore the quality of pristine MoTe<sub>2</sub> channel applied in this work, HRTEM measurements had been performed. Figure S1 displays the HRTEM image of pristine MoTe<sub>2</sub> flake. Moreover, the lattice spacing of adjacent lattice planes was obtained from FFT pattern revealed in the inset of Figure 2(c). The optical image of multi-electrode FET is shown in Figure S4(a). Moreover, to certify the FET used in this work is composed of MoTe<sub>2</sub> flake, the Raman spectrum of a n-type doped MoTe<sub>2</sub> flake, thus, was carried out, as shown in Figure S4(b). The representative Raman spectrum exhibited in Figure S4(b) contains several peaks, such as B<sup>1</sup><sub>2g</sub> (291 cm<sup>-1</sup>), E<sup>1</sup><sub>2g</sub> (233 cm<sup>-1</sup>), or A<sub>1g</sub> (173 cm<sup>-1</sup>). The experimental results prove that the material adopted in this study is MoTe<sub>2</sub> flake. On the other hand, to explore the electrical characteristics of the FET processed EB treatment, measurements of output and transfer curves had been performed, as illustrated in Figure S4(c) and (d), respectively. As the measured results depicted in Figure S4(c), the output features of the MoTe<sub>2</sub> FET are almost completely linear and symmetric, indicating good contact features. Furthermore, from the transfer curves displayed in Figure S4(d), via EB treatment, the MoTe<sub>2</sub> FET has converted into electron-dominated FET.



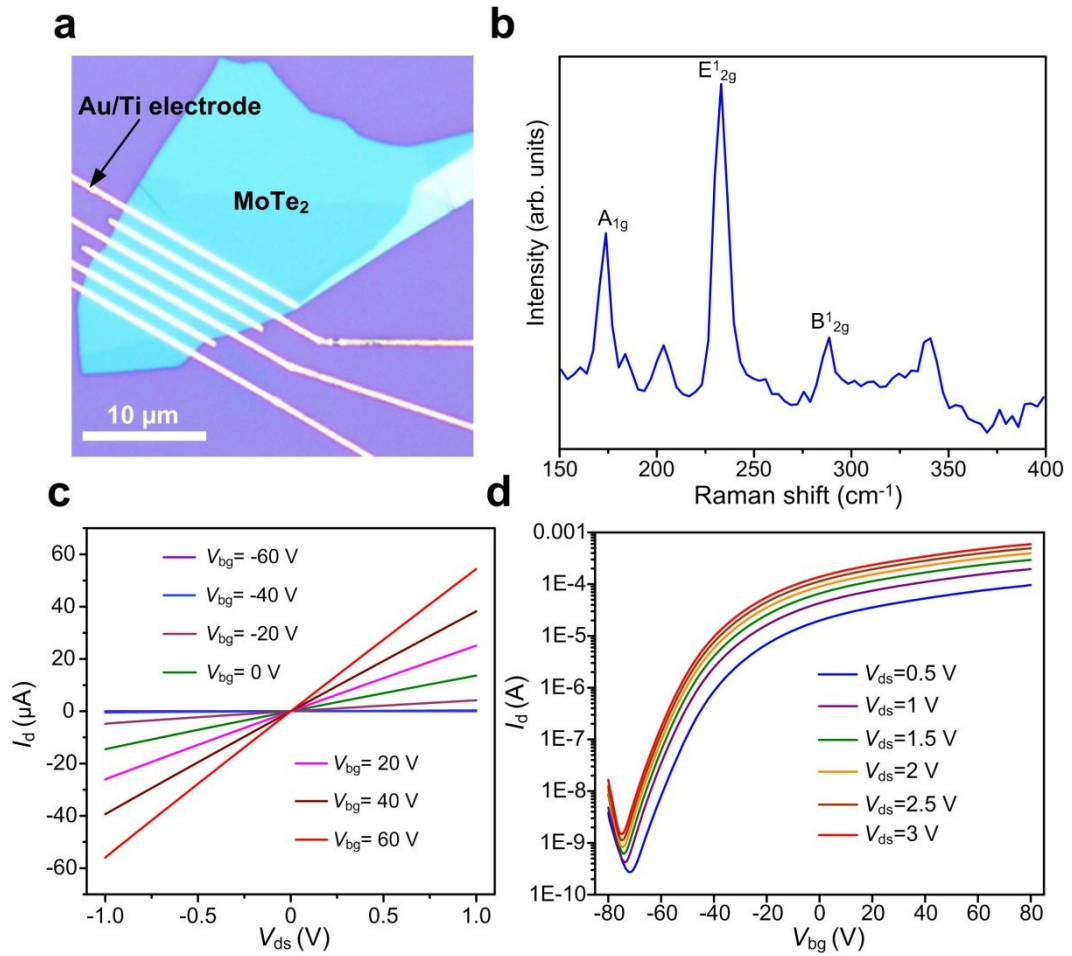
**Figure S1** FFT pattern of HRTEM image from pristine MoTe<sub>2</sub> channel.



**Figure S2** The peak shift ( $\Delta V$ ) as a function of (a) RTA temperature (b) EB dose or (c) second RTA temperature for MoTe<sub>2</sub> FET.

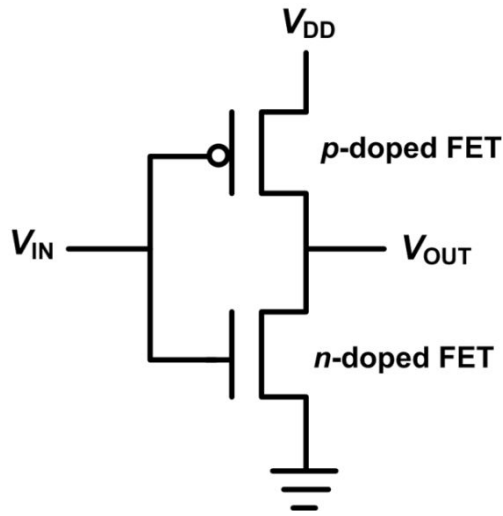


**Figure S3** XPS analysis of pristine MoTe<sub>2</sub> channel.

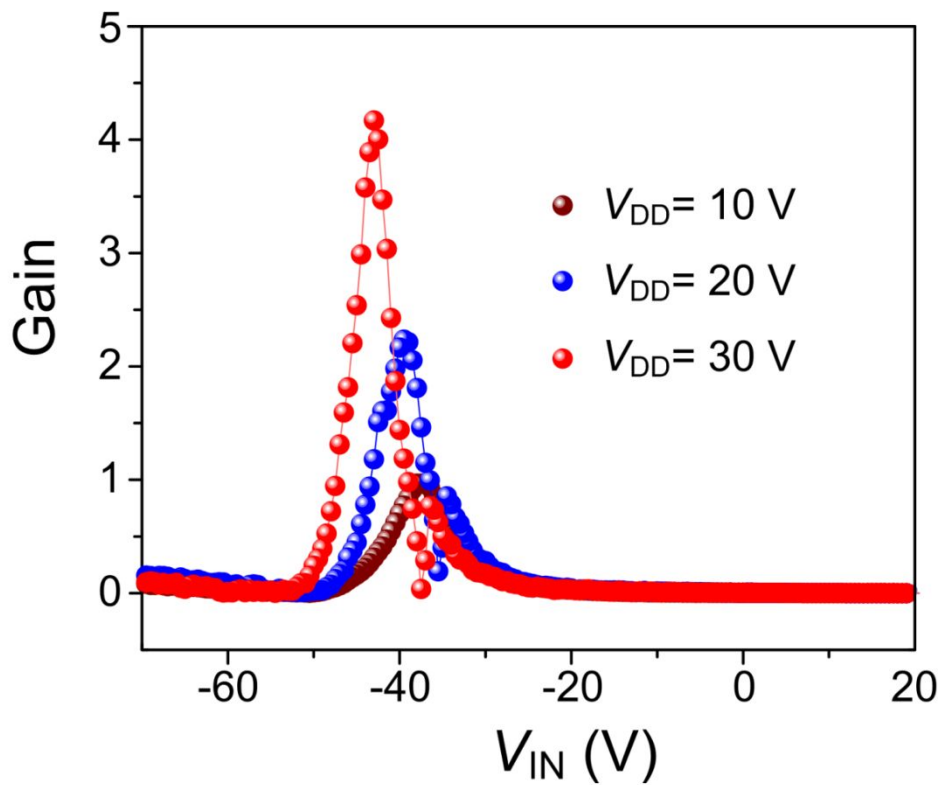


**Figure S4** (a) Optical image of the n-type doped MoTe<sub>2</sub> FET. (b) Raman spectrum of the 2H-type α-MoTe<sub>2</sub> flake.

(c) Output and (d) transfer characteristics of the n-type doped MoTe<sub>2</sub> FET.



**Figure S5** The equivalent circuit of CMOS inverter.



**Figure S6** The gains curves of CMOS inverter.