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Controllable and reproducible Major Carriers of few-layered MoTe₂ Transistors by Self-Heating treatment

Through electro-thermal doping (E-doping) processes, accurately controllable and reversible p/n-type electronic doping of 2H-molybdenum ditelluride (2H-MoTe₂) transistors is realized without any chemical dopant at room temperature.^[1] E-doping processes include electron (n-type) doping and hole (p-type) doping, achieved by an electric field in a vacuum chamber and exposure to air. It is exactly beneficial to modern manufacture by using this simplicity doping processes. Predictably, complementary metal oxide semiconductor-like (CMOS-like) logic circuits were successfully achieved, such as an inverter, a NOR gate, and a NAND gate, through controllable and reversible p/n-type doping of MoTe₂ transistors.^[2] Based on the method of p/n-type doping presented in this study, a technical feasibility was provided to develop novel 2D-based optoelectronic devices. E-doping is therefore potentially useful for optoelectronic nanodevice applications.

References

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- [2] S. Larentis, B. Fallahazad, H. C. P. Movva, K. Kim, A. Rai, T. Taniguchi, K. Watanabe, S. K. Banerjee, E. Tutuc, *ACS Nano* (2017) 11, 4832.

Figures

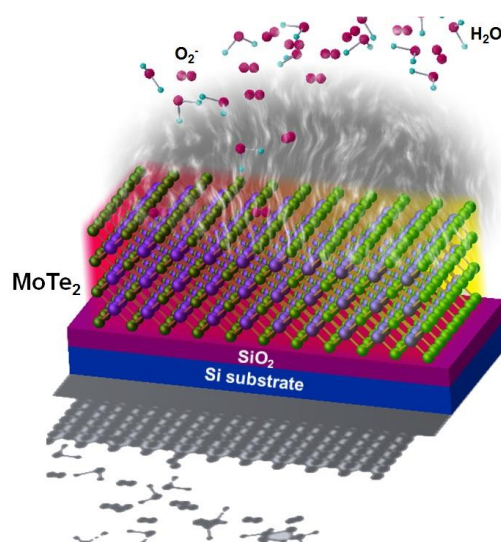


Figure 1: E-doping processes of MoTe₂ conducting channels. Schematic of a MoTe₂ channel processed by E-annealing under an electric field in vacuum.