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Electrostatic control of polarity of α-$MoTe_2$ transistors with dual top gates SHU NAKAHARAI, MAHITO YAMAMOTO, Natl Inst for Materials Sci, KEIJI UENO, Saitama Univ, YEN-FU LIN, SONG-LIN LI, KAZUHITO TSUKAGOSHI, Natl Inst for Materials Sci — Transition metal dichalcogenides have been expected for future applications in nanoelectronics due to their unique features of the atomically-thin structure. Using semiconducting α-molybdenum ditelluride (α-$MoTe_2$), we realized field effect transistors (FETs) in which the polarity (n- or p-type) can be electrostatically controlled without impurity doping. The fabricated device had a pair of top gates (aluminum electrode on silicon dioxide) attached in series with a gap length of 100 nm in between. We experimentally performed transistor operations in both n-FET and p-FET modes in a single device by changing the voltage applied to one of the two top gates, which determined the transistor polarity, and sweeping the bias of the other gate. The demonstrated reversibility of the transistor polarity will contribute to the renovated architecture of logic circuits with lower numbers of transistors and hence the lower power consumption than the conventional technology.

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