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Comment on "Depletion width measurement in an organic Schottky contact using a metal-semiconductor field-effect transistor" [Appl. Phys. Lett. 91, 083513 (2007)]

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Takshi *et al.*[1] have implemented a metal-semiconductor field-effect transistor structure in order to estimate the depletion width (W) in an organic Schottky contact. Their result indicates a nonquadratic relation between voltage and W, which is likely due to the distributed localized states in the organic semiconductor. This information is helpful for fabricating high-performance organic electronic devices. In this comment, one emphasizes that their analysis does not seem to be completely accurate.

Figure 1 of Ref. 1 shows the schematic of their devices. In order to determine W, the source electrode is connected to ground and the drain electrode is based at −0.3 V ($V_{DS}=-0.3$ V) while the gate voltage (V_{GS}) is scanned from −1 to 3 V. Figure 4 of Ref. 1 shows the drain current-V_{GS} characteristics. We find that the current does not vanish at zero bias, owing to the presence of an instrument error or photocurrent. The negligence of the current at zero bias may make the W uncertainty based on the resistor model [that is, Eq. (2) shown in Ref. 1]. On the other hand, Takshi *et al.*[1] neglected the shift in the current-voltage curve toward the positive voltage (shown in the inset of Fig. 3 of Ref. 1). The shift is induced in the presence of the built-in potential in the organic layer,[2–5] making the resistor model inapplicable in their case. The influence of the built-in potential in the organic layer on the resistor model for estimating the depletion width should be taken into account.

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