Correction to Breakdown of High-Performance Monolayer MoS_2 Transistors

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In our previous paper,[1] we report on the breakdown current density, saturation, and transconductance in an MoS_2 transistor and we give estimates of the device mobility using two-contact measurements and following the approach outlined by Lemme,[2] which involves extracting the channel mobility in a top-gated transistor from the back-gating characteristic while the top gate is disconnected.

In the meantime, we have completed 6-contact Hall effect measurements from which we deduce a mobility of 168 $cm^2/V \cdot s$ at 4 K and 60 $cm^2/V \cdot s$ at 250 K in monolayer MoS_2 and prove that the dielectric environment enhances the mobility of MoS_2.[3] Using Hall effect measurements, we were also able to accurately determine the contact resistance and capacitive coupling of the channel and the back-gate and have realized that the approach we previously used for mobility estimation is not precise enough. The top-gate dielectric can increase the capacitive coupling of the channel with the back-gate and result in an overestimated mobility by a typical factor between 10 and 50, while neglecting the contact resistance underestimates the mobility by a typical factor of 3−5.[3] Because of this, the mobility value reported in these papers is probably overestimated.[4,5] It is, however, not possible to make a more precise estimate based on the available data from two-contact devices at this point because of conflicting influences of these two error sources. The main conclusions of this paper have not changed as the accurate value of the extracted mobility does not change the directly measured the breakdown current density, ON current, or transconductance of such transistors.

REFERENCES AND NOTES

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