Abstract Submitted
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**Preparation and electrical transport property study of $MoS_2$ single-layer devices on different substrates**[1] ZHIYONG WANG, ZHISHENG LIN, RAY SACHS, Department of Physics and Astronomy, University of California, Riverside, JI FENG, International Center for Quantum Materials, Peking University, China, JING SHI, Department of Physics and Astronomy, University of California, Riverside — Micro-exfoliated MoS2 flakes on SiO2/Si substrate are identified with optical microscope first and then atomic force microscopy and Raman spectroscopy. Nanodevices are subsequently prepared by E-beam lithography. The as-prepared MoS2 devices are n-type with a high sheet resistance (typically several MOhms). As a gate voltage is applied, a large gate modulation in sheet resistance is observed. At the highest negative gate voltage, the devices remain n-type but the resistance increases by at least 4 orders of magnitude. In the meantime, the current-voltage characteristics turn from linear to non-linear. The field-effect mobility extracted from the gate voltage dependence is about 10 $cm^2/Vs$. To study the effect of the dielectric constant, we have developed a transfer technique that transfers entire working devices from SiO2/Si to any substrates. We have successfully applied the technique to graphene and obtained a relatively high yield. We are currently transferring MoS2 devices from SiO2/Si to strontium titanate (STO) substrate which has a much higher dielectric constant (300 at room temperature). Detailed experimental results and discussions will be presented.

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