

Supplementary Materials: The Effect of Twin Grain Boundary Tuned by Temperature on the Electrical Transport Properties of Monolayer MoS₂

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1. Optical Images of Samples 2 and 3

In Figure S1, we show the optical reflection images of samples 2 and 3 with twin grain boundary. And the transport measurement has been measured.

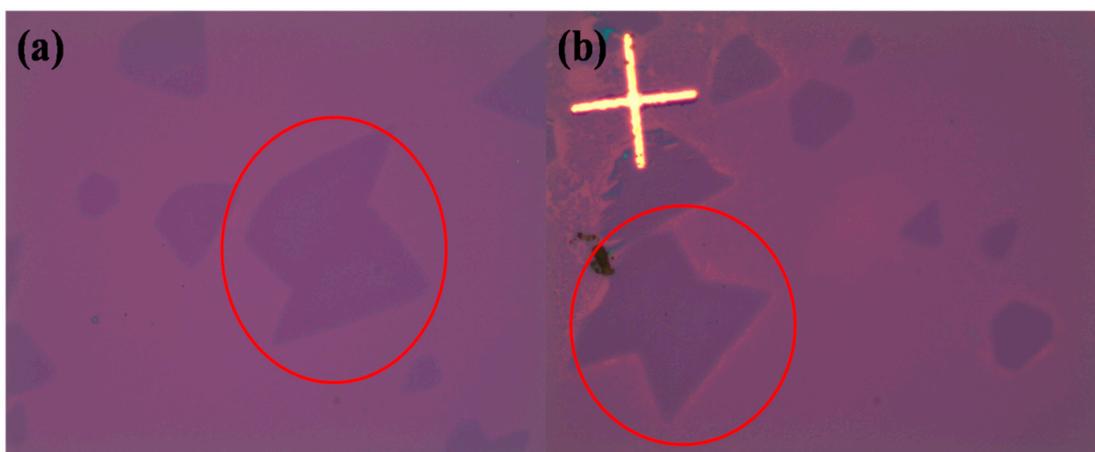


Figure S1. (a,b) Optical reflection images of samples 2 and 3 that were marked with red circles.

2. Sample 2 with Twin Grain Boundary and Transport Measurement

Figure S2 show the output characteristics and Relative conductivity of sample 2 at different temperatures. The conductance of twin GB is higher at lower temperature but lower at higher temperature than that of individual grain. The result is consistent with that in paper.

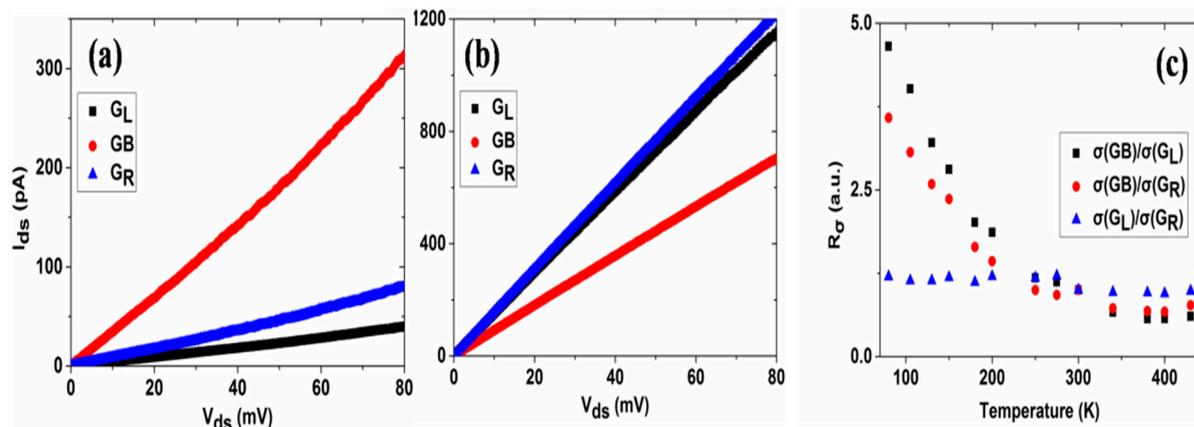


Figure S2. (a,b) Output characteristics at 80K and 430K respectively; and (c) Relative conductivity $R\sigma$ at different temperatures.

3. Sample 3 with Twin Grain Boundary and Transport Measurement

Figure S3 show the output characteristics and relative conductivity of sample 3 at different temperatures. When the transport passes through the grain boundary, the effects of GB were line with sample 2. And the transport along the GB, the conductance of twin GB is always higher than that of individual grain. The trend of relative conductivity with temperature for the transport along the twin grain boundary is as the same as the transport across the twin grain boundary.

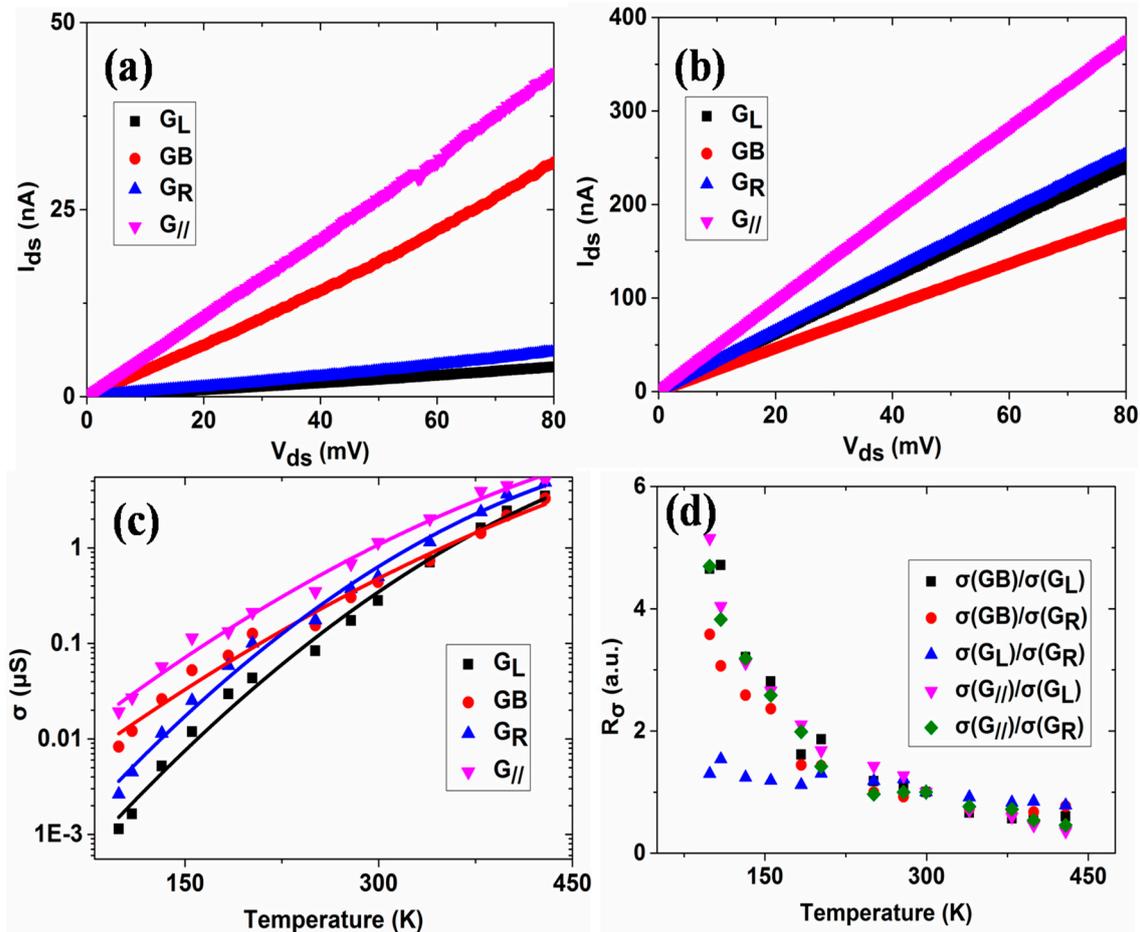


Figure S3. (a,b) Output characteristics at 90K and 430K respectively; (c) Temperature dependence of electrical conductivity σ ; and (d) Relative conductivity R_σ at different temperatures. GB represents the transport passes through the GB, and the $G_{//}$ represents the transport along the GB.

4. Sample with 0° Grain Boundary and Transport Measurement

Figure S4 show the optical image, output characteristics and Relative conductivity of sample with 0° grain boundary at different temperatures. From the results, we can see that 0° grain boundary has no effects on the transport measurement.

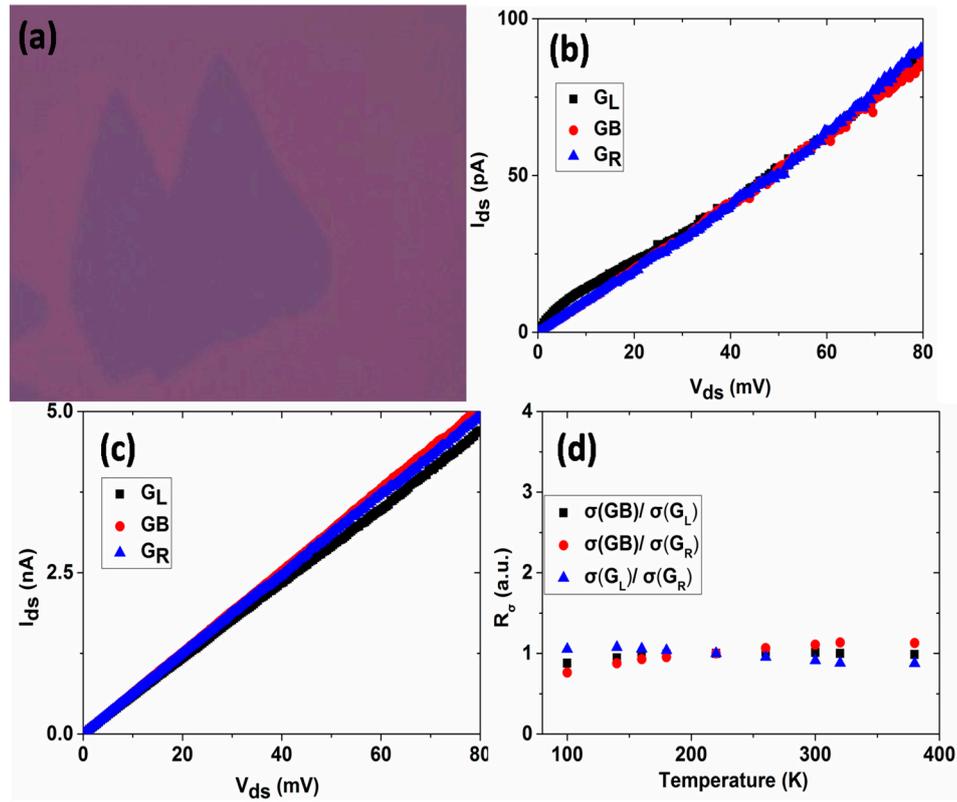


Figure S4. (a) Optical reflection image of MoS₂ with 0° grain boundary on a SiO₂ (300 nm)/Si substrate; (b,c) Output characteristics at 80K and 380K respectively; and (d) Relative conductivity R_{σ} at different temperatures.



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