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Title of the Presentation: Quantum transport study of ultrahigh mobility 2D Bi_2O_2Se

First Name: Jingyue

Last Name: Wang

Affiliation: College of Chemistry and Molecular Engineering, Peking University, Beijing, China

Email: wangjingyuephysics@pku.edu.cn

Short Biography:

I received my bachelor's degree from Shandong University in the year 2015 and got Ph.D. degree from Peking University in the year 2020. Now, I am a post-doctoral in professer Hailin Peng's group in College of Chemistry and Molecular Engineering, Peking University. My research interests mainly focus on quantum transport study on ultra-high mobility semiconductor and topological materials.

Abstract:

Two-dimensional high mobility semiconductors hold great potential for fabricating modern electronics. Layered material Bi_2O_2Se is one candidate which owns prominent performances in the field of photodetectors, FET, gas sensors and so on. [1] [2] [3] Recently, we developed a new chemical vapor deposition method to grow free-standing Bi_2O_2Se nanoplates to avoid doping from mica substrate. [4]

The Hall mobility of the free-standing nanoplates is around 100,000 cm^2/Vs at 2 K and 600 cm^2/Vs at room temperature. Analysing low temperatue Shubnikov–de Haas oscillations, we succeeded in observing multi bands in free-standing nanoplates. We carried out angular dependence of the magnetoresistance and found out multi bands originate from bulk and surface of the nanoplates. Gating experiment also confirmed the results.

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[2] J. Yin et al., Nature Commun 9, 3311 (2018).

[3] S. Xu et al., Angew. Chem. Int. Ed. 59, 17938 (2020).

[4] C. Tan et al., Acta Phys. -Chim. Sin. 36, 1908038 (2020).

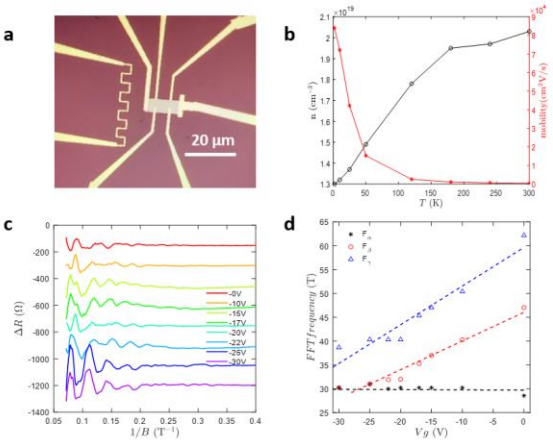

Fig. 1. (a) Optical image of the device. (b) Carrier density and mobility at different temperature. (c) Quantum oscillations gated by back voltage. (d) Bands movement under different back voltage.