High sensitive detection of Acetone gas using Graphene nanoribbon sensor

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In the last few decades, gas sensing is perceived as one of most valuable and important technology to detect the toxic gases (NO_2, Acetone, CO, CH_4, H_2S, and SO_2) in the atmosphere, which is very important for human health care. Moreover, gas sensors play a vital role in medical diagnosis, food safety control, and industrial safety [1-2]. Thus, the real-time gas environmental monitoring sensor is very much needed to our daily life. Traditional metal oxide gas sensors showed good sensitivity and low cost in fabrication. However, their performance still has shortcomings such as poor selectivity, drift of its characteristics, etc [3]. To overcome these problems, we report UV-assisted graphene nano ribbon (GNR) sensor. Fig. 1a shows the schematic illustration of the graphene nanoribbon sensor, which was exposed with UV light during the measurements. Fig. 1 b displays the I_d vs V_g measurement of GNR sensor under at 400 ppb concentration of acetone with UV exposure. These results revealed that the acetone vapor accepts the electron from the GNR such that the Dirac point voltage shifts to more positive direction. The exposure of UV light accelerated the movement of acetone inside the chamber which led to the enhanced gas sensing response of acetone gas. In addition to these results, GNR sensor showed reproducibility and stability even at low concentration of 400 ppb as depicted in Fig.1 c.

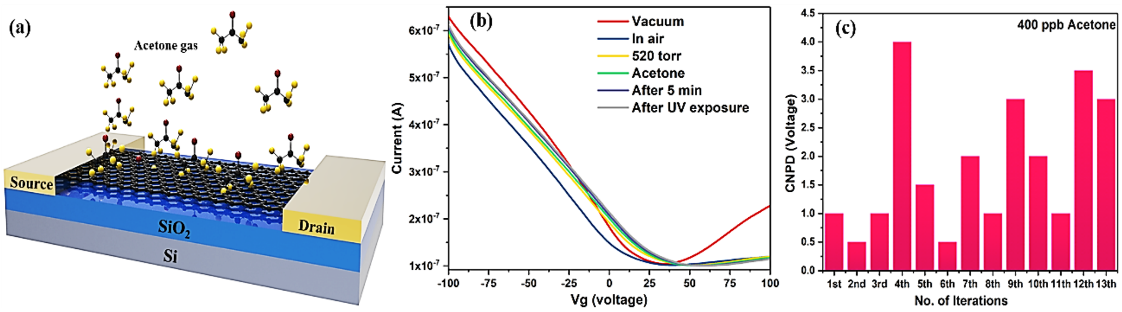

Fig. 1 Schematic illustration of GNR sensor, (b) I_d-V_g characteristics under different gas environmental conditions, (c) Reproducibility of GNR sensor for acetone gas.

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Reference

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