Wearable Sensors for Breath Monitoring made with Water-based Hexagonal Boron Nitride Inks via Supramolecular Functionalization

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Smart wearable humidity sensors are attracting strong attention as they enable to monitor important physiological information in real time, such as pulse oximetry, and enable activity tracking and air quality assessment [1]. Two dimensional (2D) materials, especially graphene oxide (GO), have triggered strong research interest for humidity sensing due to their tuneable surface chemistry, high surface area, ultrathin thickness, processability in water and easy integration onto flexible substrates [2]. However, large hysteresis, low sensitivity and strong cross-sensitivity issues limit the use of GO for practical wearable applications [3], where continuous monitoring is needed. Herein, we demonstrate a wearable and wireless impedance-based humidity sensor made with functionalized hexagonal boron nitride (h-BN) nanosheets [4], which shows enhanced sensitivity (>10^{10} Ohms/%RH from 5% to 100% RH) and fast response (0.1 ms) [5]. We finally show that the sensor is able to record in real time the subtlest changes of respiratory signals associated with different daily activities as well as various symptoms of flu, without any direct contact with the individual [5].

References

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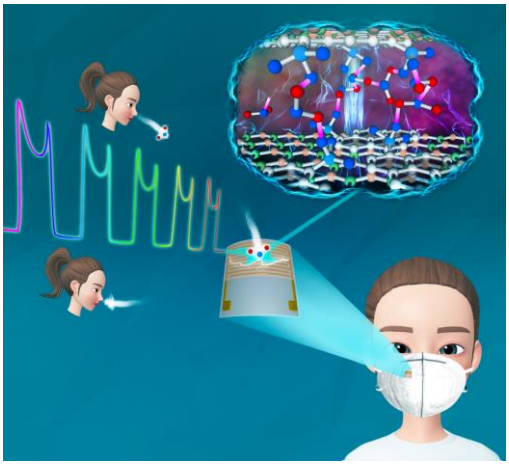
Figures



Graphical abstract