

Ammonia sensor using N-doped graphene quantum dots/polyaniline composite

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Abstract

The present study investigated a resistive ammonia (NH_3) gas sensor fabricated using polyaniline (PANI) and N-doped graphene quantum dots (N-GQDs) dopant on a transparent and flexible substrate with interdigitated electrodes. The sensing response of the PANI to NH_3 increased from 9.12 to 86.91 at 1500 ppm with the addition of 50 wt% N-GQDs. This shows that sensing response of N-GQDs/PANI sensor for NH_3 detection is enhanced by the N-GQDs added into PANI. It can be attributed to the π - π interaction between conducting polymer and N-GQDs. The response time of the N-GQDs doped sensor decreased to 9.8 min when compared with the sensor without N-GQDs. The combination of the N-GQDs and PANI enhanced the sensing properties. The N-GQDs/PANI gas sensor exhibited an excellent room temperature selectivity and stability. The advantages of this sensor include high response, flexibility, simple structure, easy fabrication and low cost. The NH_3 -sensing mechanism of the sensor has been explained.

Keywords: PANI, N-GQDs, Ammonia