Free-standing ZnO nanorods based field-effect transistor for highly efficient ammonia chemical sensor

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We have synthesized free-standing zinc oxide nanorods (ZnO NRs) on Si/SiO2 substrate between source-drain to fabricate field-effect transistor (FET) based chemical sensor for ammonia detection. A low cost solution process grown ZnO NRs were found to be grown in high density and possess good crystalline quality. The electrical properties of the fabricated sensor with and without ammonia were investigated. While measuring the ammonia with increasing concentration by I-V characterization, we found the reproducible sensitivity of 42.06 μA cm-2 mM-1 in the wide linear range (0.01 μM - 2.5 mM) with the high correlation coefficient (R2 = 0.9898) and very low detection limit (0.07 μM). The sensors were also tested for its day-to-day stability and its response towards a range of common interferents. Furthermore, the obtained results indicate that fabricated FET based ammonia sensor has potential to be used as a low-cost, fast, and portable device to environmental monitoring and sensing for disease diagnosis.