Ultra-stable CoV_2O_6 hydrogen gas sensor, operating at room temperature

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The constantly increasing demand for flexible, reliable and stable gas sensors, operating at room temperature, which would be integrated with present electronic circuits for real life applications is a true fact. In the present work, the gas sensing properties of bimetallic cobalt-vanadium-oxide system (CoV_2O_6) under the effect of deposition method (spin coating, direct ink writing and drop-casting) as well as the type of substrate (glass, flexible PET), at room temperature were examined. The spin-coated sensor on glass substrate exhibited the higher response (65.2%) towards 1000 ppm H_2 at room temperature, compared to those that were deposited with the other methods, showing a response and recovery time of 94 s and 74 s, respectively. The CoV_2O_6 flexible PET sensor exhibited a response of 36.6% against 1000 ppm H_2, at room temperature, with a response and recovery time of 120 s and 80 s, respectively. In addition, both operation under bending conditions at 180^o and the reliability, in terms of repeatability of signal and stability after 1 year, were studied for the CoV_2O_6 flexible PET sensor. Finally, a sensing mechanism is proposed taking into account the thickness and architecture of the films as well as film variations and imperfections of the active sensing surface, such as micro-cracks, edges and pores. These parameters play a dominant role on the gas sensing performance far greater than that of the substrate or the metal electrodes. The realization of a CoV_2O_6 flexible sensor demonstrates its potential for real-life applications [1].

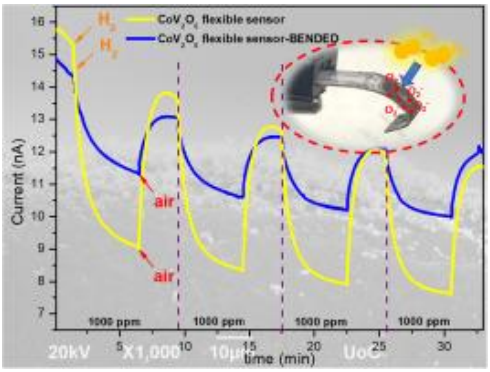

Figure 1: Gas sensing performance of flexible CoV_2O_6 bended sensor towards hydrogen, operating at room temperature

References

[1] M.Moschogiannaki et al., Microelectronic Engineering, **262**, 111819 (2022).

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