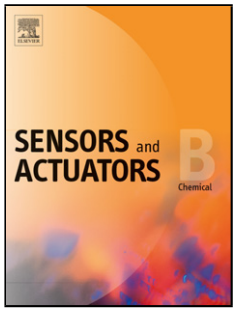

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Sensitivity and Stability Improvement by Fusing Optimized Micro-hotplatform and Double Layer Bowl-like Nano Arrays

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Highlights

- Successfully fabricating two types of sensors fusing micro-hotplatform with single layer (SL) and double layer (DL) tin dioxide bowl-like nano arrays respectively.
- The sensitivity and stability of sensors with double layer bowl-like nano arrays were better than that of single layer.
- The sensors with double layer bowl-like nano arrays were sensitive to 20ppb ethanol and the detection limit was estimated to 7ppb.
- Before stabilization, SL sensors gone through about 80% decrease of response while DL sensors only about 40%.

Abstract: Sensors with single layer (SL) and double layer (DL) tin dioxide porous bowl-like nano arrays were prepared via two-dimensional (2D) colloidal crystal template method and their sensing response and stability towards ethanol were investigated. The Micro-HotPlatform (MHP), which was the substrate of the sensor, was carefully designed and fabricated to achieve low power consumption, well-controlled temperature distribution and high mechanical strength. It was found that with the help of DL bowl-like nano arrays (BNA) the sensitivity and stability of sensors with double layers were better than that of single layer. The DL sensors were sensitive to 20 ppb ethanol and the low detection limit was predicted to be as low as 7 ppb. Further experiments indicated that after seven days continuous work, the performance of the sensors became stable. Before stabilization, SL sensors gone through about 80% decrease of response while DL sensors only about 40%. DL sensors showed better performance and were good candidates for future commercial applications.

Keywords: Tin dioxide; Micro-Hotplatform; Sensitivity; Stability; Bowl-like nano arrays

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