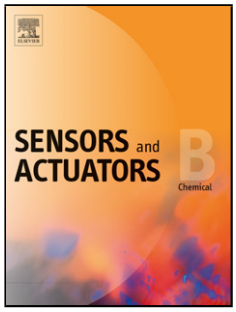

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Gas modulating effect in room temperature ammonia sensing

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HIGHLIGHT

- Bi_2WO_6 exhibited highly selective and sensitive sensing response to ammonia at room temperature. An abnormal gas sensing interference was observed in ammonia-ethanol dual gas system. A new insight into the interference in multi-component gas sensing was proposed.

Abstract: A novel gas induced modulating effect on gas sensing was observed with Bi_2WO_6 nanoparticles based gas sensors in ethanol-ammonia dual gas system at room temperature. The sensors presented high response to ammonia at room temperature, while no response to other common reducing gases such as hydrogen, ethanol, acetone, and carbon monoxide. Similar outstanding selectivity to ethanol at elevated temperatures (such as 250 ℃) was also obtained. Interestingly, the sensors exhibited a reduced response with a sharp conductance increase during the recovery process in the co-presence of ammonia and ethanol, as compared to that only in the presence of ammonia. And the gas response to certain amount of ammonia decreased with increasing the concentration of ethanol in the background. This abnormal sensing behavior in the dual gas system was ascribed to the result of multistep gas adsorption and desorption processes on material surface. On the basis of surface reactions between targeted gases and active oxygen species adsorbed on sensing materials, cross-sensitivity is one of the most significant concerns in semiconductor oxide based gas sensing. However, this work might give a new insight into the interference in multi-component gas sensing which occurs within targeted gases, and also indicate an indirect room temperature gas detection strategy.