

Response of TiO₂/MWCNT/B₂O₃ gas sensor to hydrogen using different organic binder

ABSTRACT

A binder influences the sensitivity, resistivity and optimal operating temperature of a gas sensor, which plays an important role in gas sensing. This work compared the sensitivity of the TiO₂/MWCNT/B₂O₃ gas sensor to hydrogen with the addition of different organic binders, namely linseed oil and ethyl cellulose, to TiO₂/MWCNT/B₂O₃ paste. Both pastes were deposited on alumina substrate using the screen-printing method and annealed at 500 °C. The sensing films of gas sensor, OBL and OBE were characterized by field emission scanning electron microscopy (FESEM), Energy dispersive x-ray (EDX), X-ray diffraction (XRD) Raman Spectroscopy and Brunauer-Emmett-Teller (BET). The gas sensors were also exposed to different concentrations of hydrogen (100–1000 ppm) at various operating temperature (100 °C, 200 °C and 300 °C). The obtained results revealed that ethyl cellulose-based gas sensor achieves better sensitivity, whereas linseed oil-based gas sensor has better conductivity and recovery characteristic.

Keyword: Organic binder; Linseed oil; Paste; Gas sensor; TiO₂/MWCNT/B₂O₃