BRINZARI, V., KOROTCENKOV, G. et al. The influence of gold nanoparticles on the conductivity response of SnO2-based thin film gas sensors. In: Applied Surface Science 2015, Volume 353, 30 , pp. 793-803

Abstract The results presented in this study demonstrate that the successive ionic layer deposition (SILD) method for gold nanoparticle formation can be used for surface functionalization of SnO2 films to improve their gas sensing properties. As a result of successive treatments in HAuCl4·nH2O and NaBH4 solutions, gold nanoparticles can be formed on the surface of SnO2 crystallites. The size of the gold particles varies over the range of 1–50 nm depending on the number of SILD cycles. Gas sensing characteristics of the Au-modified SnO2 films are discussed as well. Unlike most studies focused on the development of CO sensors, the present research focuses on the specifics of the response of the SnO2:Au-based sensors to other gases, such as hydrogen and ozone. It is established that gold nanoparticles deposited on the SnO2 surface are active toward both reducing and oxidizing gases, and the effect of the SnO2 surface decoration by the gold nanoparticles on the gas sensing characteristics depends on the number of deposition cycles (i.e., the size of the gold particles). The sensitization to ozone and hydrogen suggests that the application of the surface modification by gold in the field of gas sensor design should not be limited by optimization of the CO sensor's parameters. Models showing the promotional role of Au additives are discussed, and a mechanism of sensitization in the SnO2:Au-based gas sensor is proposed.