

Effect of biasing voltages and electrode metals and materials on the sensitivity of electron beam evaporated HfO₂ thin film CO sensor

S.M.A. Durrani *, M.F. Al-Kuhaili

Physics Department, King Fahd University of Petroleum and Minerals, Dhahran 31261, Saudi Arabia

Received 2 July 2007; received in revised form 22 October 2007; accepted 30 October 2007

Abstract

Thin films of hafnium oxide of different thicknesses were deposited by electron beam evaporation. The effects of the sensor biasing voltage, electrode metal (Ag, Al, Pt and Au) and electrode configuration on the carbon monoxide (CO) sensing of hafnium oxide thin films were investigated. It was found that the CO-sensing properties depend on the sensor biasing voltage. Hafnium oxide showed two different sensing mechanisms with the variation of biasing voltage: at lower biasing voltage the mechanism was found to be of reducing type, while at higher biasing voltage it was of oxidizing type. Moreover it was found that the CO-sensing properties depend both on the electrode materials and configuration. The sensor response and recovery times have also been measured.

© 2007 Elsevier B.V. All rights reserved.

Keywords: Thin film; CO sensor; HfO₂; Semiconductor sensor
