

Gas Sensitive Behaviour and Morphology of Reactive Evaporated V₂O₅ Thin Films

J. Wöllenstein^{1,3}, M. Scheulin², N. Herres², W. J. Becker³ and H. Böttner¹

¹Fraunhofer Institut Physikalische Meßtechnik, Heidenhofstr. 8, D-79110 Freiburg, Germany

²Interstaatliche Hochschule für Technik Buchs, Institut für Mikrosystemtechnik,
Werdenbergstr. 4, CH-9471 Buchs SG, Switzerland

³Universität Kassel, Elektrische Meßtechnik, Wilhelmshöher Allee, D-34121 Kassel, Germany

(Received February 10, 2003; accepted July 20, 2003)

Key words: vanadium pentoxide (V₂O₅), thin film, gas sensor

The gas-sensing characteristics and the morphology of vanadium pentoxide thin films have been investigated. The thin films were prepared by reactive electron beam evaporation of vanadium on surface-oxidised silicon wafers and additional thermal oxidation. Structural and morphological analyses of the V₂O₅ thin films in the thickness range of 100–200nm were performed. The polycrystalline monophase V₂O₅ films consist of grains with surface areas in the range of 100 nm to 1 μm square. Gas measurements were carried out with single-chip thin-film sensor arrays in synthetic air with 50% humidity. The sensors are analytically suitable as they are sensitive to ammonia, methane, carbon monoxide and nitric dioxide. Particularly for NO₂, a distinctive temperature dependence of the gas reaction has been observed.