Dissertation

$BaFe_{(1-x)-0.01}Al_{0.01}Ta_xO_{3-\delta}$: A material for temperature independent resistive and thermoelectric oxygen sensors

Verfasser: Dr.-Ing. Murat Bektas

Zusammenfassung

Metal-oxide semiconductor resistive oxygen sensors can be applied to control combustion processes. Such oxygen sensors may be an alternative to potentiometric or amperometric oxygen sensors due to their relatively low production costs. A limited number of semiconducting oxides is of special interest, since they show an almost temperature independent but strongly oxygen concentration dependent resistivity. The most intensively investigated Iron doped Strontium Titanate (STF) shows some instabilities in real exhaust gas applications. Therefore, Barium Iron Aluminum Tantalum Oxide (BFAT) was investigated in this thesis.

This work deals with the synthesis and the characterization of the sensor material BFAT both in the form of bulk samples and thick-films. The electrical conductivity and the Seebeck-coefficient of the sensor material were simultaneously determined in the temperature range 600 – 950 °C and in a wide oxygen partial pressure range. Defect chemical constants were derived and an initial defect chemical model of BFAT was discussed in this study.

Sensor films were produced at room temperature by using the novel coating technique “Aerosol-Deposition-Method”, abbreviated ADM. A combination of temperature independent resistive and thermoelectric BFAT oxygen sensor were manufactured and investigated. The sensors were tested successfully not only in gas mixtures but also in the exhaust pipe of a diesel engine.

Bestellinformation / Order information

Autor: Murat Bektas
Titel: $BaFe_{(1-x)-0.01}Al_{0.01}Ta_xO_{3-\delta}$: A material for temperature independent resistive and thermoelectric oxygen sensors
Reihe: Bayreuther Beiträge zur Sensorik und Messtechnik, Bd. 31
Herausgeber: Ralf Moos und Gerhard Fischerauer
Verlag: Shaker-Verlag, Düren (2020)
ISBN: 978-3-8440-7459-8

Kontakt

E-Mail: funktionsmaterialien@uni-bayreuth.de
Telefon: +49 921 55 7401