

第691回 化学・物質工学セミナー 開催のお知らせ

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Role of surface p-n heterojunctions in the gas sensing with SMOX based devices - the example of $\text{PtO}_x\text{-SnO}_2$

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場所：総合教育研究棟2階 多目的ホール

ドイツのチュービンゲン大学のUdo Weimar教授とNicolae Barsan博士の研究グループは、半導体型ガスセンサの表面反応解析やエレクトロニックノーズ等の研究を精力的に進めておられます。今回の講演では、特に、半導体ガスセンサのガス検知特性に及ぼすp-nヘテロ接合の役割についてご講演いただきます。

Abstract

Resistive gas sensors based on semiconducting metal oxides (SMOX), such as SnO_2 , WO_3 and In_2O_3 , are widely applied for the detection of flammable or toxic gases such as hydrogen, methane or carbon monoxide. In order to overcome the disadvantages of pristine SMOX, such as low selectivity, strong interference with water vapour and poor stability, the semiconducting oxides are loaded with catalytically active metals, such as Pd, Pt or Au; this procedure is often referred to as doping. In normal operation conditions, the first two are found at the surface of the supporting oxide in oxidized form building a p-n type of surface heterojunction. Their presence has a marked impact on both the surface chemistry and conduction through the sensing layer.

Our contribution presents an update of the concepts related to the role of surface p-n heterojunctions in controlling the sensing properties of the resulting sensors. Experimental results obtained with the help of various operando investigation techniques will be presented and interpreted with the help of novel mechanistic concepts for the exemplary case of Pt doping.

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