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Review Article

Receptor Function and Response of Semiconductor Gas Sensor

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Abstract

Theoretical approaches to receptor function and response of semiconductor gas sensor are described, following the illustrations of some relevant key issues such as tunneling transport. Depletion in small semiconductor crystals is characterized by the occurrence of new type depletion (volume depletion) after conventional one (regional depletion), and inclusion of both types makes it possible to formulate the receptor function and response to oxygen (air base), oxidizing gas (nitrogen dioxide), and reducing gas (hydrogen). The equations derived theoretically using physical parameters of the semiconductor side and chemical parameters of the gases side appear to reproduce satisfactorily the sensing behavior to the aforementioned gases as well as the influence of changes in physical parameters such as grain size and donor density. Extension to the semiconductor crystals dispersed with surface electron-traps shows that the traps act as a sensitizer to promote sensor response.