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**The Behavior of Surface Adsorbed Pd Activation Layer on SnO_x
Thin Film with Temperature in CH₄ Sensing**

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Abstract

As a chemical sensor for detecting inflammable gases such as CH₄, C₃H₈, etc., thin film type SnO_x-based sensor device were fabricated. SnO_x thin film were grown 1000 Å thick using reactive ion-assisted deposition (IAD) on Al₂O₃ substrate. Ultrathin Pd activation layer were surface adsorbed with 10-30 Å thickness on SnO_x thin film by ion-beam sputtering. Pd/SnO_x system were annealed in air for 2hr at the temperature of 100 - 500°C. The gas sensitivity of the device after annealing were recorded and the influence of the formation of PdO at different conditions on sensitivity were also investigated by Auger electron spectroscopy, x-ray photoelectron spectroscopy, and scanning electron microscopy. Moreover, Pd layer were adsorbed in vacuum onto SnO_x thin films kept at 300°C and cooled down to reduce the oxidation effect and the device showed high sensitivity as much as 80% for CH₄.