Contribution submission to the conference Dresden 2026

Room-temperature H_2 gas sensing in ultra-thin SnO_2 films grown via atomic layer deposition — •Rudi Tschammer[1], Dominic Guttmann[1], Carlo Tiebe[2], Karsten Henkel[1], Carlos Morales[1], and Jan Ingo Flege[1] — [1]Applied Physics and Semiconductor Spectroscopy, BTU Cottbus-Senftenberg, Cottbus, Germany — [2]Bundesanstalt für Materialforschung und -prüfung (BAM), Berlin, Germany

Transitioning to an energy system based entirely on renewable energy sources requires long-term energy storage utilizing energy vectors such as hydrogen (H_2). Given its high diffusivity, broad explosive range, and low ignition energy, the adoption of H_2 requires safety systems along the hydrogen value chain. Therefore, there is a need for sensitive, specific and selective conductometric H_2 sensors operating at room temperature (RT) and compatible with complementary metal-oxide semiconductor (CMOS) technology. Earlier work by our group investigated ultra-thin cerium oxide films grown by atomic layer deposition (ALD) and demonstrated H_2 sensing at RT. This performance was due to the abundant defects present in the films. Building on these results, we present a comprehensive investigation of ALD-grown tin oxide (SnO_2), a widely researched metal oxide for H_2 gas sensing. Using *in-situ* X-ray photoelectron spectroscopy (XPS), we observe a distinct dependence of defect concentration on film thickness and oxidant. *Ex-situ* H_2/air gas sensing measurements and near-ambient pressure XPS further link film properties and sensing behavior. These findings pave the way for novel RT H_2 gas sensors based on ALD technology.

Part:	**DS**
Type:	**Vortrag;Talk**
Topic:	**Thin Film Properties: Structure, Morphology and Composition (XRD, TEM, XPS, SIMS, RBS, AFM, ...)**
Keywords:	**Tin oxide; Atomic Layer Deposition (ALD); X-ray photoelectron spectroscopy (XPS); Spectroscopic ellipsometry (SE)**
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