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Bare and Pd-doped ceria thin films prepared by ALD and EBE for hydrogen detection — •Yuliia Kosto[1], Paulina Kapuscik[2], Rudi Tschammer[1], Dominic Guttmann[1], Ewa Mankowska[2], Peter Matvija[3], Carlos Morales[1], Michal Mazur[2], Karsten Henkel[1], Iva Matolinova[3], Jaroslaw Domaradzki[2], and Jan Ingo Flege[1] — [1]BTU Cottbus-Senftenberg, Appl Phys & Semicond Spect, Cottbus, Germany — [2]Wroclaw Univ Sci & Technol, Fac Elect Photon & Microsyst, Wroclaw, Poland — [3]Charles Univ, Dept Surface & Plasma Sci, Prague , Czech

The need to store and use hydrogen safely as part of green economy based on renewable energy evokes a necessity to reliably detect it at ambient conditions. The majority of currently used sensors are working at elevated temperatures (200-500 °C). In this work, we demonstrate that ceria films deposited on a commercial electrode by atomic layer deposition (ALD) and electron beam evaporation (EBE) electrically respond to hydrogen (from 20 to 500 ppm) at much lower temperatures (50-200 °C). The results reveal that <1.5 nm thin Pd adlayer increases the electrical response by several orders of magnitude for both ceria films. The NAP-XPS study under changing oxidative/reductive atmospheres sheds light on the mechanism of Pd-CeOx thermal activation and the role of the deposition technique in the reactivity of the oxide.

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