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Title:	Polyvinylpyrrolidone-Stabilized Palladium Nanocrystals as Chemiresistive Sensors for Low-Concentration Hydrogen Gas Detection
Authors:	S. Sivakumar, Nikhil (/jspui/browse?type=author&value=S.+Sivakumar%2C+Nikhil)
Keywords:	Hydrogen X-ray photoelectron spectroscopy Palladium, Sensors
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Citation:	ACS Applied Nano Materials, 4(2), 1643–1653.
Abstract:	Low-concentration hydrogen (H ₂) gas detection is of paramount importance in space applications as well as in medical applications. It is also critically important for safe handling of hydrogen below the explosive limit. Here, we report a hybrid Pd metal–polymer chemiresistive sensor that can sense 0.5% H ₂ gas in ambient conditions of temperature and pressure with the highest sensitivity (~50%) reported until now, making it an extremely good sensor for real-life low-concentration H ₂ gas detection. The sensor is easy to fabricate and is also extremely cost-effective for commercial applications. The obtained hybrid chemiresistive sensor comprises palladium nanocrystals bound by oxygen and nitrogen atoms of a stabilizer, polyvinylpyrrolidone, grown on top of a self-assembled monolayer. The rise-time constant is proposed to arise from hydrogen loading at the (111) surface of the palladium nanocrystal, which is a very fast process, and subsequent fast diffusion of the H atoms from the surface into the bulk. An effort to increase the number of available sites by UV-ozone cleaning resulted in degradation of the sensing device due to poisoning of the available sites by oxygen.
Description:	Only IISER Mohali authors are available in the record
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