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H2 gas sensing properties of a Pd/ZnO:Eu nanosensor

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Abstract

Hydrogen is considered fuel for the future, but its properties make it dangerous to use without protection from leaks and explosions, meaning that hydrogen gas sensors are necessary for safe use and storage of this important gas. Gas sensors based on semiconducting material like ZnO have been studied intensively, especially multiple methods of improving their parameters with doping, functionalization, etc. In this work, ZnO was doped with Eu during electrodeposition (ranging from 2 μM to 22 μM) and functionalized with Pd nanoparticles on its surface. The effects of doping and functionalization were studied, observing an improvement in response value (S) to 100 ppm hydrogen gas up to S~3965 at 150 °C of Pd-functionalized ZnO:Eu nanosensor compared to S~150-200 to non-functionalized ZnO:Eu with similar doping concentration. The obtained results on a single Pd-functionalized ZnO:Eu nanowire-based nanosensor can be used for further improvement of synthesis parameters that can lead to the production of low-cost and highly efficient ZnO:Eu Pd-functionalized miniaturized gas sensors, selective to H2 gas, even at room temperature, for personal, industrial, safety and environmental use.

Keywords: *hydrogen, nanosensor, Pd-functionalized*

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