

## CHEMICAL GAS SENSORS BASED ON C-Pd FILMS

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Chemical gas detection system is used to monitor environmental and industrial processes to protect our life and to safeguard plant and manufacturing equipment against dangerous gases, for example hydrogen. Safety standards are always applied in production and processing this type of gases. Recently novel sensing materials with unique structures have been developed for using them as active layers in hydrogen sensors.

In this paper we present results of our studies on the new chemical sensor and its sensing characteristics in hydrogen and hydrogen containing gases atmosphere. Our sensor is based on carbonaceous–palladium film (C-Pd). The film was synthesized in PVD (Physical Vapor Deposition) process on alumina substrate ( $\text{Al}_2\text{O}_3$ ) and was composed of palladium nanocrystallites placed in carbonaceous matrix. SEM image showing the morphology of C-Pd film is presented in Fig. 1. Depending on the palladium content in the film and structure of carbonaceous matrix different gases can be detected. The structure and composition of active sensor film also affects its resistance.

We found that the C-Pd film (with 580 $\Omega$  resistance) was sensitive for hydrogen at concentrations from 0.02 % up to 0.5%.

In Fig. 2 we present the resistance changes ( $\Delta R$ ) of  $\text{H}_2$  sensor for different  $\text{H}_2$  concentrations, where  $\Delta R$  is defined according to eq. (1)

$$\Delta R = \frac{R_{H_2} - R_{air}}{R_{air}} * 100\% \quad (1)$$

where  $R_{H_2}$  is the film resistance in hydrogen atmosphere,  $R_{air}$  is the film resistance in air.

It was found that with increasing of  $\text{H}_2$  concentration the value of resistance changes increases.

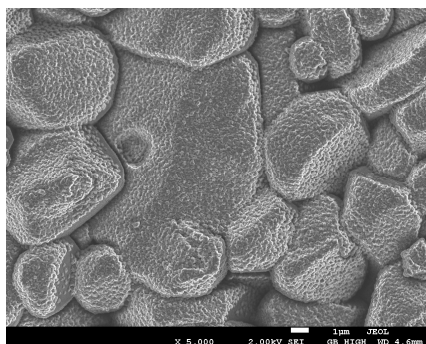


Fig.1. SEM image of C-Pd film.

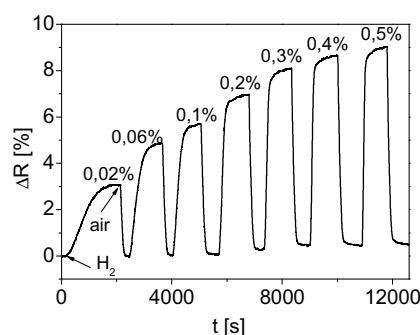


Fig. 2 The resistance changes of C-Pd film for various  $\text{H}_2$  concentrations

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