INFLUENCE OF CVD DURATION PROCESS ON MORPHOLOGY, STRUCTURE, AND SENSING PROPERTIES OF CARBONACEOUS-PALLADIUM THIN FILMS

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We present the nanocomposite carbonaceous-palladium thin films prepared by physical vapor deposition (PVD) and chemical vapor deposition (CVD) methods. Scanning electron microscope (SEM) and TEM (transmission electron microscope) methods were used to study the topography, morphology and structure of carbon and palladium nanograins contained in these films. The initial PVD films were modified in a CVD quartz reactor using xylene as a modifying factor at different time (5, 10 and 30 minutes) at a constant temperature ~650°C in atmospheric pressure. It was observed that the average size of palladium nanograins increases with an increasing duration of modification process. An amount of xylene was also increased, what caused the growth of thickness of graphite shells around Pd nanograins. In all samples Pd nanograins with the size above 300 nm were found regardless of CVD duration process. These large nanograins in TEM studies were not screened by electron beam. The differences in microstructures observed in the CVD films modified at different times, affect their response in measurements of resistance changes in the gas containing H_2 in various concentrations. All samples were measured by cathodoluminescence (CL) method. In CL studies a large amount of objects with high intensity of CL was found. Some of them show the emission bands both at 450 nm and 750 nm. Other reveals emission band only at 450 nm. CL observations show that Pd nanograins coated by graphite shells exhibit optical activity.

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