

## Nanostructural C-Pd coatings obtained in 2-steps PVD/CVD technological process

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### Materials

#### ABSTRACT

**Purpose:** The paper presents scanning electron microscopy (SEM) and transmission electron microscopy (TEM) investigation results of nanoporous coatings based on palladium and carbon, obtained in two steps process – first step – physical vacuum deposition (PVD) and second step chemical vacuum deposition (CVD).

**Design/methodology/approach:** Studies of topographical and structural properties of coatings obtained in the first and the second step of technological process.

**Findings:** Pd content included in the volume of a coating obtained in PVD process affects on a distribution and sizes of Pd nanocrystals. The diameter of Pd nanocrystals obtained for coatings with lower Pd content is lower than for coating with higher Pd content. Modification of these coatings in CVD process at temperature of 650°C leads to obtain a different form of the final coating: for coating with lower content of Pd, the CVD process causes formation of nanoporous C-Pd coating; for coating with higher Pd content, formation of bigger Pd crystals is found. Temperature higher than 650°C leads to coatings growth with non-porous structure.

**Practical implications:** Obtained coatings can be used as active layer in hydrogen and hydrogen compounds sensors or in hydrogen storage applications.

**Originality/value:** Two steps method of presented coatings obtaining was originally elaborated by our group in Tele- & Radio-Research Institute.

**Keywords:** Coating deposition; Structure and morphology; Electron microscopy; Nanoporous materials

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### 1. Introduction

Nanoporous materials possess highly-developed surface and high pore volume. A highly-developed surface of nanoporous carbon coating promotes efficient adsorption process that allows

their use in various types of detectors [1-4]. Sensitivity of such detector depends on efficiency, reversibility and speed of desorption process. These phenomena of adsorption/desorption are connected with composition and structure of an active coating used in a detector. In case of nanoporous coatings based on palladium and carbonaceous nanostructures high efficiency of