STRUCTURE OF RHENIUM COATINGS OBTAINED BY CVD

N. V. Gelfond, N. B. Morozova, E. S. Filatov, S. A. Gromilov, and I. K. Igumenov

UDC 543.442.2:620.187:621.793.:661.668′719

By chemical vapor deposition in the hydrogen atmosphere from $Re_2(CO)_{10}$ and $Re(CO)_3(Cp)$ on steel and ceramic (C/SiC) substrates, rhenium coatings are obtained with an average thickness of 3-13 μm, when $Re_2(CO)_{10}$ is used, and of 2-8 μm when depositing from $Re(CO)_3(Cp)$. The coatings are studied by X-ray diffraction and scanning electron microscopy. It is shown that when $Re_2(CO)_{10}$ is used, an increase in the deposition temperature results in the growth of textured coatings with preferred orientation of crystallites in the [0 0 2] direction. At the same time, a tendency for decreasing the size of rhenium crystallites is observed. With the change of evaporator temperature, the structure of Re coatings obtained from $Re(CO)_3(Cp)$ on steel substrates changes considerably: from compact non-layered without the obvious growth direction ($T_{evaporator}$ = 120°C) to a three-layer structure, where the initial layer has a compact structure followed by columnar and powdered layers ($T_{evaporator}$ = 110°C). A fine compact coating is formed on ceramic substrates at an evaporator temperature of 110°C.

Keywords: Re coatings, X-ray diffraction, scanning electron microscopy, chemical vapor deposition (CVD), dirhenium decacarbonyl, cyclopentadienyl rhenium tricarbonyl.