
Synthesis of carbon/metal nanocomposites by PVD/PECVD

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Abstract

A hybrid plasma process has been employed to prepare metal/carbon nanocomposite thin films. This process combines magnetron sputtering of metal target and plasma enhanced chemical vapor deposition using methane as a precursor for carbon deposition. Two metals have been selected for this study: titanium and nickel.

These films can be synthesized in a wide range of chemical composition from pure metal to pure carbon by varying the methane ratio in the argon/methane plasma.

The microstructure analysis revealed that the Ti containing carbon films were formed of TiC nanoparticles embedded in a hydrogenated amorphous carbon matrix. By adjusting the carbon content within the films, the size of the nanoparticles can be controlled in the 3-30 nm range.

For Ni/C thin films, an original microstructure corresponding to Ni nanowires embedded in an amorphous carbon phase has been identified.

Keywords: sputtering, thin films, nanocomposites, nickel, titanium, carbon

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