OPTICA APPLICATA online
A quarterly of the Institute of Physics, Wroclaw University of Technology
open access
Wroclaw University of Technology
INSTITUTE OF PHYSICS

Optica Applicata 2009(Vol.39), No.4, pp. 951-957

Fabrication and electrochemical properties of diamond layers grown on tungsten wire by HF CVD method

Riwana Torz-Piotrowska, Cezary Uniszkiewicz, Maciej Szreiber, Andrzej Wrzyszczynski, Elzbieta Staryga, Tomasz Runka, Dobroslawa Kasprowicz

Keywords

CVD diamond, diamond, cyclic voltammetry, Raman spectroscopy, scanning electron microscopy (SEM)

Abstract

Un-doped polycrystalline diamond thin films have been grown on tungsten substrates by hot filament chemical vapor deposition (HF CVD) using a hydrogen and methanol vapor mixture. Diamond films have been analyzed by Raman spectroscopy and scanning electron microscopy (SEM). Cyclic voltammetric behavior of diamond films of different quality and morphology has been studied in acetonitryle with $(n\text{-Bu})_4NClO_4$ and in 0.1 M KCl aqueous solutions. Preliminary cyclic voltammetry (CV) measurements showed that our electrodes have a wide potential range over which negligible background response current is observed. The potential windows depend on the type of solvent. In the case of water solution the decomposition of water occurs electrochemically and evolves O_2 during positive (anodic) polarization and H_2 evolution during negative (cathodic) polarization. The electrochemical properties of diamond electrodes have been evaluated by performing cyclic voltammetry measurements in $[Fe(CN)_6]^{3-/4-}$ with 0.1 M KCl. The electrode demonstrates reversible kinetics during electrochemical analysis.