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Electron paramagnetic resonance and scanning electron microscopy characterization of diamond films fabricated by HF CVD method

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Keywords

hot filament chemical vapour deposition (HF CVD), diamond, electron paramagnetic resonance (EPR), Raman spectroscopy

Abstract

Defects in diamond films, produced by the hot filament chemical vapour deposition (HF CVD) of methanol and hydrogen mixture as function of gas composition, were investigated by electron paramagnetic resonance (EPR), scanning electron microscopy (SEM) and Raman spectroscopy measurements. We found an isotropic g -value (2.003 ± 0.0002) independent of growth conditions. The peak-to-peak of EPR line width changes from 0.3 to 0.6 mT and the spin density increases from $2.3 \cdot 10^{17}$ to $3.2 \cdot 10^{18}$ spin/cm⁻³ with increasing concentration of methanol vapour. The EPR line in general shows double character and was found to be superposition of two components, a narrower Lorentzian and a broader Gaussian, suggesting the existence of two different types of defects in diamond layer. EPR measurements were supported by SEM observation.

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