

# Growth of Pristine Diamond and Boron Doped Diamond and Characterizations via pulsed RF Glow Discharge

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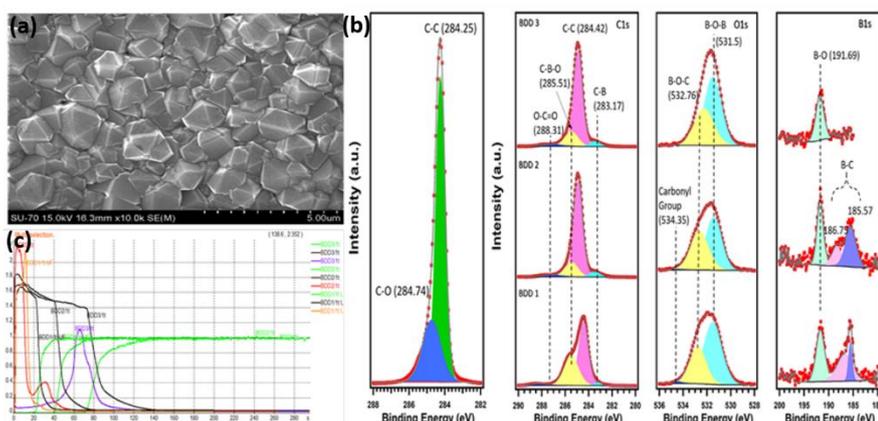
## Abstract

Hot filament chemically vapor deposited (HFCVD) Diamond-based coatings are the object of very active research work for electrical, biological, electrochemical and mechanical applications [1]. Pristine diamond (PD) and boron-doped diamond (BDD) thin films were deposited by HFCVD using methane and hydrogen as precursor gases and boron oxide (B<sub>2</sub>O<sub>3</sub>) in ethanol as the source of boron doping. Scanning Electron Microscopy clearly shows the diamond thin films as the microcrystalline, and Micro-Raman dispersion spectroscopy shows the presence of D and G bands from the structural defects and graphite presence. The Rietveld refinement of the diffraction patterns (of PDD and BDD) indicates that boron incorporation within the diamond crystalline structure takes place with consequent increase of the diamond lattice parameters. Pulsed RF Glow Discharge Optical Emission Spectrometry (pulsed RF GD-OES) was used to obtain elemental depth profiles, and X-rays photoelectron spectroscopy (XPS) measurements confirm effective incorporation of boron onto the diamond crystalline structure as indicated by Rietveld refinement analysis. It is also notably demonstrated the application and benefits provided by the special operation mode (UFS) for GD-OES since it enables fast elemental profiles, with excellent depth resolutions and sharp interfaces. Finally, the on-line interferometer built in the GD-OES source (DIP) [2] is useful to measure the erosion rate and layer thickness of the HFCVD diamond-based thin films.

## References

- [1] E.Salgueiredo, M.Amarala, F.A.Almeida, A.J.S.Fernandes, F.J.Oliveira and R.F.Silva, Surface and Coatings Technology, 236 (2013) 380.
- [2] S. Gaiaschi, S. Richard, a P. Chapon and O. Acher, J. Anal. At. Spectrom, 32 (2017) 1798.

## Figures



**Figure 1:** (a) Shows the microcrystalline diamonds on Si substrates, (b) Shows the Boron profile obtained from GDOES and (c) Shows the HR XPS of pristine and boron doped diamonds on Si substrate