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The X-ray photoemission (XPS) spectroscopy is a suitable technique to finely characterize the surface chemistry and the reactivity of nanodiamonds (ND) [1]. Nevertheless, the interpretation of XPS spectra needs to be carefully considered as the ND size becomes comparable to the photoelectrons inelastic mean free path in diamond, namely a few nanometers [2]. In that case, due to geometrical consideration, an enhancement of the carbon signal occurs, as reported by Baer et al [3].

In the present study, detonation nanodiamonds were annealed between 800 and 950°C under vacuum or argon atmospheres to form sp^2 carbon at their surface [4]. The monitoring by XPS of induced modifications versus the annealing temperature will be presented. Results will be then compared to HR-TEM, FTIR and Raman measurements. According to XPS, the part of sp^2 carbon rises up to 30% for detonation ND annealed at 1100 °C under vacuum. Looking to HR-TEM images, the graphitization is only limited to the first outer shell. This is explained by a nano effect which exalts the extreme surface chemistry of detonation ND by a factor of 2.5 in the C1s core level.

References

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