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Carbon Based Materials Synthesized by Microwave Plasma Enhanced Chemical Vapor Deposition

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Due to evolution of nano-technological applications, the demand of 1D-, 2D- and 3D-carbon-based materials are constantly increasing. Indeed, these materials have excellent mechanical, thermal and etectrical properties and can be used for a large range of applications starting from cutting tools, electronic devices to medical applications [1, 2, 3]. Carbon materials can be synthetized in sp^2 and/or sp^3 forms and basically,.Plasma Assisted Chemical Vapour Deposition (PACVD) in a resonant cavity is one of the most versatile techniques to obtain them [4].

Also, nanocrystalline diamond (NCD) due to its high biocompatibility and its anti-bacterial property, diamond films have a large potential of uses: blood vessel stents, microprobes and coatings for devices that would facilitate bone growth or repair [5].

In this paper we will discuss about the principles and main advantages of this technology for the synthesis of graphene, nanotubes and diamond. In particular, we will discuss about plasma composition and how the corresponding chemistry allows us controlling the growth of carbon atoms as graphene, nanotubes and diamond. The key role played by the substrate will be discussed as well.

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