

## Nanostructured carbon formation in IR laser-induced dielectric breakdown in benzene

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There is a great interest in nanoforms of carbon, which is due to their novel properties and many potential uses [1]. A catalyst/oxidant-free IR laser-induced decomposition of hydrocarbons allowing chemical vapor deposition (LCVD) of nanostructured carbon has been examined with pulsed CO<sub>2</sub> laser radiations. This process yields graphene layer-containing carbon nanoparticles with properties are more affected by the nature of hydrocarbon than by laser power [2,3].

In this work we report on the yet unreported LCVD of nanostructured carbon achieved through focused TEA CO<sub>2</sub> laser radiation-induced dielectric breakdown in benzene in the presence and absence of metal (Ni, Co) sheets allowing chemical vapour deposition of nanostructured carbon.

The process occurs through transient formation of C atoms and ions, C<sub>2</sub> and, when Co or Ni sheets are ablated, metal atoms that were detected in the gas phase by optical emission spectroscopy (OES). These results implies that although the amount of produced metal atoms is not enough to be detected in the solid deposits, the metal presence influences the ionization degree of the produced carbon atoms and the agglomeration of the C<sub>n</sub> species. Different features of carbon deposited on distant glass substrates and on the metal (Ni, Co) sheets adjacent to the visible plume were revealed by FTIR, Auger and Raman spectroscopy and electron microscopy and are explained by surface assisted carbonization. The carbon deposited on the metal sheet differs from that deposited on glass in having more C=C and O-H bonds and possibly more fullerene moieties.

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