CHEMICAL DESIGN FOR THE TAILORED PRODUCTION OF METAL-DOPED NANOSTRUCTURED CARBON FOAM BY LASER ABLATION

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Carbon nanostructured materials such as nanofoams [1], single-walled nanotubes [2,3], and nanohorns [3] can be efficiently produced by laser ablation of carbon-containing targets. Relevant laser parameters such as wavelength, pulse repetition rate, laser fluence (pulsed- or cw mode) or irradiance, as well as other experimental conditions (mainly atmosphere composition and pressure, target composition, and external or laser-generated heating) strongly affect the recombination of the evaporated species and, therefore, the nature and properties of the produced materials [4,5].

The present work thus pretends to illustrate the potential of using selected organometallic precursors for the tailored production of metal-doped nanostructured carbon foams. Laser ablation of the employed organometallic precursors leads to the formation of soot exhibiting a spongy texture. High-resolution transmission electron microscopy studies reveal that these materials consist of metal nanoparticles embedded in carbon matrices comprising both amorphous carbon and graphitic nanostructures. The results reported here suggest that the nature and properties of the produced materials can be tailored at the molecular level by conveniently choosing the metals and ligands of the ablated targets. A new family of carbon nanostructured materials can be thus envisioned by employing the simple, versatile laser ablation technique described in this work [6].

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