Plasma and Vacuum Assisted Synthesis of Nanostructured Carbon Allotropes

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Abstract :

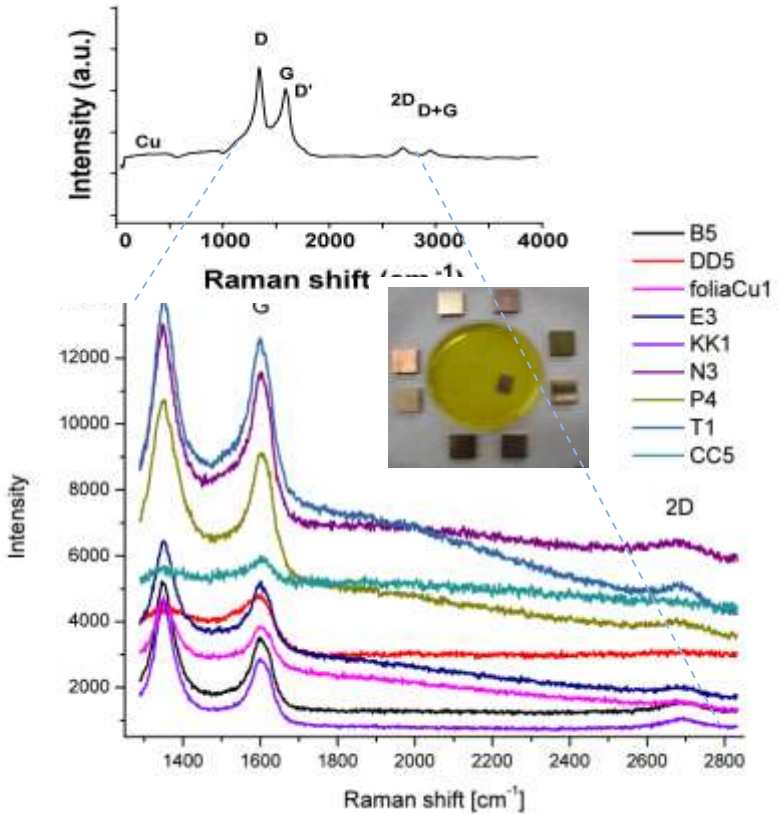
Nanostructured carbon allotropes including graphene, carbon nanowalls, carbon nanotubes, and nanocrystalline diamond have drawn considerable attention due to their outstanding electrical, mechanical, and optical properties and their potential applications in variety of fields. Their unique characteristics placed them among the most promising molecular building blocks in nanotechnology. Therefore, it is necessary to investigate procedures that allow a selective growth and methods which enable the control of size and surface functionalization and fully exploit the great potential of carbon nanostructures. Plasma- and vacuum- assisted synthesis techniques have been used as a strategy to assist the precursor's dissociation and to facilitate the nanomaterial growth at low temperatures. A summary of such strategies were presented by the authors [1] in a review article. These deposition methods offer the advantage of allowing the adaption of systems and technologies that are currently used in microfabrication facilities, therefore facilitating their integration in novel devices [2].

In our presentation, we will give various examples of nanostructure carbon materials synthesized using different techniques, applied both at atmospheric and low pressure regimes, as well as ones produced by plasma assisted techniques carried out on PLASMIONIQUE's FLR900-H PECVD reactor. Examples of the impact of Cu-alloy composition on synthesized film properties can be seen visually as well as their Raman spectrum. Applications of carbon allotropes related for chemical sensors will also be highlighted.

References:

[1] M. Ionescu, et al. ESC Transactions, 25,8, (2009), 737-748

[2] J-B. Kpetsu, et al. Nanoscale Res. Lett. 4;5, 3, (2010), 539-544



Raman spectrum of multi-layer graphene synthesized on different Cu alloys using liquid precursors.