Influence of the synthesis variables on the quality of the CVD-grown graphene deposited over polycrystalline nickel

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Abstract

Graphene, an extraordinary two-dimensional carbon material with a honeycomb structure, has been the focus of many researches due to its characteristics and extraordinary mechanical, electronic and optical properties. Chemical Vapor Deposition (CVD) method has been shown to produce large-area and high quality graphene. In CVD, Ni and Cu are normally used as substrates, although other transition metals are used, but less usual [1].
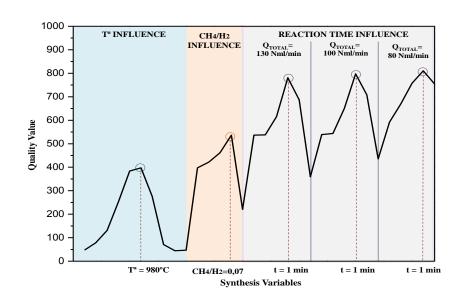
In order to improve the quality of the graphene layers deposited on Ni substrates, the CVD method has been optimized. Excel-VBA application was designed to check the graphene quality. This way, the image of the sample obtained was analyzed by using optical microscopy. This Excel-VBA application allowed knowing the percentage of each type of graphene presents in the synthesized graphene sheet. Thereby, it was assigned an average value for the image as a whole ranging from 1 and 1000. The unity would correspond to multilayer graphene, 10 was assigned to few-layers graphene, 100 would correspond to bilayer graphene, and finally 1000 was assigned to monolayer graphene. [1]. As a result a weighted index was obtained that defined the average quality of the resulting graphene deposited over Ni substrates. Raman spectroscopy was used to analyze the obtained graphene [2].

The objective of this work was to improve the homogeneity and quality of the graphene synthesized by CVD over Ni substrates. To reach this aim, the main parameters affecting the synthesis of CVD-grown graphene were optimized in order to obtain a weighted index as close as possible to 1000 (monolayer graphene).

References

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Figures