

Characterization of Carbon Nanotubes with TiO₂ by the (CVD) Chemical Vapor Deposition Method

Abraham A. Mejía¹, L. Béjar², C. Parra³, C. Aguilar⁴, A. Medina², E. Huape Padilla², S. E Borjas-García² and J. L. Bernal⁵

¹Alumno Doctorado Posgrado de la Facultad de Ingeniería Mecánica, Universidad Michoacana de San Nicolás de Hidalgo, Ciudad Universitaria, Michoacán, México

²UMSNH. Ciudad Universitaria. Morelia, Michoacán. México

³ Departamento de Física, Universidad Técnica Federico Santa María, Valparaíso, Chile.

⁴Departamento de Ingeniería Metalúrgica y Materiales, Universidad Técnica Federico Santa María, Valparaíso, Chile

⁵Departamento de Ingeniería Mecánica. Instituto Tecnológico de Orizaba, Veracruz México.

There are different methods for the manufacture of carbon nanotubes with various methods, methods and elements of the periodic table. The processes of (CVD) can be classified according to the type of application, process and reactor used, or precursor and chemical reaction used. [1-3] One of the methods used for the development of this work (CVD) by chemical vapor deposition for the processing of materials such as TiO₂. The organic precursor used was ethylene C₂H₄ at 300 L/min for 30 minutes, in an argon atmosphere throughout the synthesis; The elements were cobalt, iron and TiO₂ that were used as a catalyst, were placed in an aluminum crucible to catalyze at a temperature of 600°C, and then placed in a quartz tube of 0.1016 m in diameter at 1 m. length, at a temperature of 730°C. In this investigation, we show a study of the morphology of the sample by Raman Spectroscopy which was carried out in an Invia Reflex Raman microscope (RENISHAW); To check if possible, obtain carbon nanotubes with the elements by this method. Raman Spectroscopy results as illustrated in Figure 1, with an approximate resolution of 1cm⁻¹. The literature indicates that the characteristic peaks of single-walled nanotubes (SWNT) appear at a frequency of less than 200 cm⁻¹ [4]. The band disorder called band D is generated if the peak is at a frequency of 1340 cm⁻¹, which is determined as poorly organized graphite [5-6]. The G band is at a frequency of 1500 to 1600 cm⁻¹ and are characteristic of individual nanotubes and multiple wall. [4-6]. The values found in Raman spectroscopy for the first peak of 1347.31 cm⁻¹, 1467.48 u.a. and for the second 1577.67 cm⁻¹, 2156.79 u.a. The Micrographs (SEM) Scanning Electron Microscopy were performed in an EVO MA 10 Unit to ratify Raman Spectroscopies. The micrographs proved agglomeration figure 2(a) with several parameters and lengths thus presenting a new measurement of length, the diameter between 58.99 to 100 nm. Figure 2(b). This research proposes a simple, innovative and effective method to synthesize carbon nanotubes by CVD.

References:

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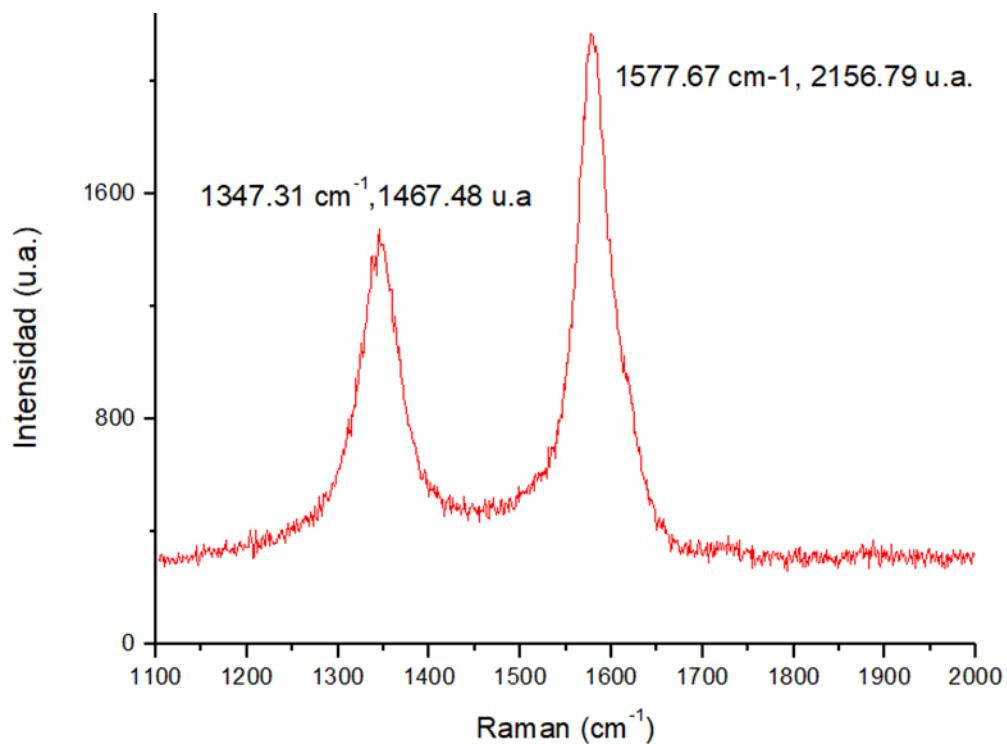


Figure 1. Multiple Wall Raman Spectroscopy.

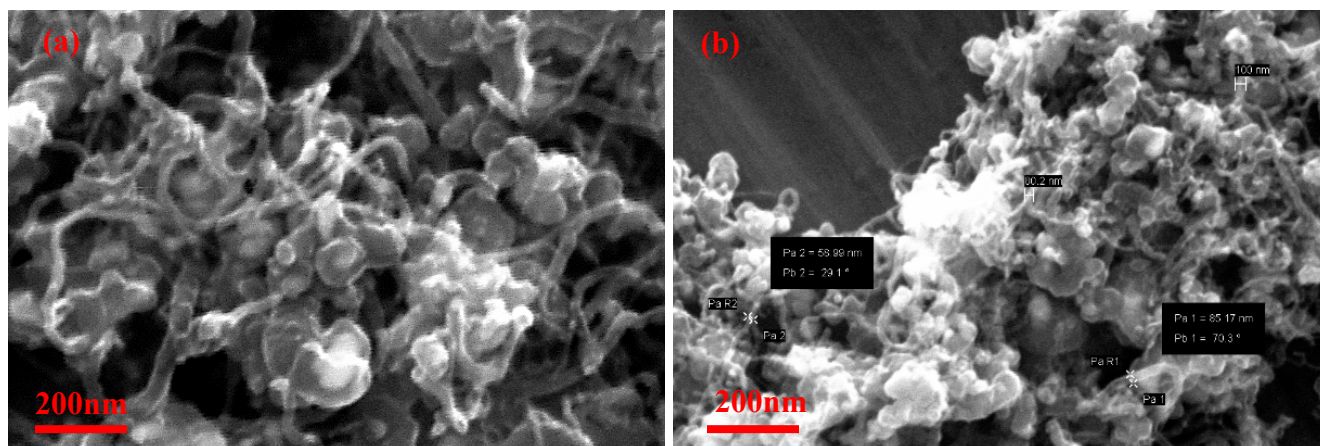


Figure 2. Morphology of carbon nanotubes with TiO₂ (a) magnification at 40.00 kX, (b) magnification at 20.00 kX.