

N Doped Multiwall Carbon Nanotubes Growth over a Ni Catalyst Substrate

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Abstract : In this work, we study the carbon nanotubes (CNTs) formation by catalytic chemical vapor deposition (CCVD) over a catalyst with 20 % of Ni supported over $\text{La}_2\text{Zr}_2\text{O}_7$ (Ni20LZO). The high C solubility of Ni made it one of the most used in CNTs synthesis. Nevertheless, Ni presents also sintering and coalescence at high temperature. These troubles can be reduced by choosing a suitable support. We propose $\text{La}_2\text{Zr}_2\text{O}_7$ as for this matter since the incorporation of Ni by co-precipitation and calcination at 900 °C allows a good dispersion and interaction of the active metal (in the oxidized form, NiO) with this support. The CCVD was performed using 1 g of Ni20LZO at 950 °C during 30 min in Ar:H₂ atmosphere (2.5 L/min). The precursor, benzylamine, was added by a nebulizer-sprayer. X ray diffraction study shows the phase separation of NiO and $\text{La}_2\text{Zr}_2\text{O}_7$ after the calcination and the reduction to Ni after the synthesis. Raman spectra show D and G bands with a ID/IG ratio of 0.75. Elemental study verifies the incorporation of 1% of N. Thermogravimetric analysis shows the oxidation process start at around 450 °C. Future studies will determine the application potential of the samples.

Keywords : N doped carbon nanotubes, catalytic chemical vapor deposition, nickel catalyst, bimetallic oxide

Conference Title : ICMNT 2020 : International Conference on Micro and Nano Technology

Conference Location : Venice, Italy

Conference Dates : November 12-13, 2020