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Abstract
We report our results in arc discharge production of carbon nanotubes (CNTs). The purpose of this research is to build up basic capacity in production of metallic and preferably multiple wall carbon nanotube (MWCNT). An arc discharge chamber was designed, built and tested. A 10 mm diameter carbon rod made of highly purified carbon is used as cathode, and a 25 mm rod is used as anode. Water cooling is used to keep the electrodes housing at room temperature. The discharge current was between 140 A to 175 A, the pressure was between 130 -550 Torr , and the production rate for CNT with soot is about tens of g/h.
we found the pressure fluctuate widely due to evaporation of the carbon rod, hence the discharge current, temperature and the magnetic field due to discharge current also fluctuate violently during the experiment. In SEM and TEM pictures, we found a lot kinds of carbon's allomerism. These are graphite, fullerene and different from diameter, length and walls' MWNTs. We also toke the sample according to every position, found the carbon produced by arc discharge process. The sample that is obtained close to the place that discharges, MWNTs in the sample form cathode is more than anode' s. In TEM pictures, we found the MWNTs' diameter is between 10nm to 20nm, the wall is between 12 to 41. We toke the data to calculate on www.nanohub.org . The MWNT (diameter is 10nm) is a (74,74) Armchair's carbon nanotube, the DOS Energy Range is 5.43eV, Bandgap Magnitude eV is 0.054496eV. According to the result that Raman measures, the sample that is obtained close to the place that discharges, the crystallite size is smaller, the boundary is more. According to the result that XRD measures, the sample is pure carbon's materials. In field emission's experiment, we found the sample's electron emission is 0.037(A/cm2), the characteristic is follow F-N formula. The chemistry of this arc discharge chamber production of CNTs is a handy application by the inspection in the future.
Advisory Committee Max Chung - advisor

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