In this work, thermal chemical vapor deposition was utilized to synthesize carbon nanotubes (CNTs). Methane (CH$_4$) was the main source for carbon, and argon (Ar) was used as the carrier gas. CNTs were synthesized from carbon atoms obtained from catalytic thermal decomposition of methane. The synthesized CNTs were subsequently annealed in an argon atmosphere. Scanning electron microscopy (SEM), energy dispersive spectrometer (EDS) and Raman spectroscopy were employed to study the effect of thermal annealing treatment on the properties of CNTs. From experimental data, it is found that the surface morphology, structure, and field emission property of CNTs are strongly dependent on the temperature and duration of thermal treatment employed. Only treatments at the appropriate temperature (200℃) for specific amount of time (10 to 20 minutes) can result in the enhancement of field emission characteristics of CNTs. This enhancement of emitted current is primarily due to the remedy of defects on the surfaces of CNTs and the recrystallization of amorphous carbon originally residing on the surfaces of CNTs. These can result in the exposure of the graphite tip of CNTs and the increase of emitted current as well. Outside of this temperature and duration range, thermal treatments can only deteriorate the structure of CNTs, and hence degrade the field emission characteristics of CNTs.


