

## **Formation of carbon nanotubes from methane decomposition: Effect of concentration of Fe<sub>3</sub>O<sub>4</sub> on the diameters distributions**

### **Abstract**

Fe<sub>3</sub>O<sub>4</sub> was used to synthesize narrow diameter of carbon nanotubes (CNTs). The effect of concentration of Fe<sub>3</sub>O<sub>4</sub> on the diameters of carbon nanotubes (CNTs) synthesized by methane decomposition at 1000°C was investigated. We used conventional impregnation method to prepare Fe<sub>3</sub>O<sub>4</sub>/MgO catalysts. The results show that the concentration of Fe<sub>3</sub>O<sub>4</sub> greatly affects the diameter distributions of produced CNTs. The CNTs formed by Fe<sub>3</sub>O<sub>4</sub>/MgO catalysts, with the mole ratio set at 0.25:9.75 and 1:9 had diameter of  $3.23 \pm 1.71$  and  $49.04 \pm 33.62$ nm, respectively, showing that a decrease in concentration of Fe<sub>3</sub>O<sub>4</sub> yields smaller diameter and narrower diameter distribution. A growth model explaining tip-growth and base-growth mechanism is proposed for understanding formation of CNTs.

**Keywords;** Chemical Vapor Deposition (CVD), Graphite, Impregnation Method, Methane, Nanotubes