Foreign Winner	
Third Winner	**Rank**
Basic Research	**Category**
Dr. Huiming Cheng	**Researcher**
Chinese	**Nationality**
Institute of Metal Research , Chinese Academy of Sciences	**University**
Synthesis, Structure and Properties of Carbon Nanotubes	**Project Title**

Abstract

Carbon nanotubes (CNTs) have attracted great interest since their first discovery in 1991, because of their unique structure, outstanding physical and chemical properties, and wide application prospect. CNTs can be classified into two categories: multi-walled carbon nanotubes (MWNTs) and single-walled carbon nanotubes (SWNTs), and they can be synthesized in a large scale by three main methods: electric arc discharge, laser ablation and catalytic decomposition of hydrocarbons or CVD. In this topic, the structure of CNTs will be briefly introduced, the recent progresses in the synthesis of carbon nanotubes will be overviewed, and in particular, the large-scale synthesis of SWNTs by the semi-continuous hydrogen electric arc method and hydrocarbon catalytic decomposition method developed at our lab will be reported.

Carbon nanotubes are theoretically predicted and/or experimentally proved to have many unique and excellent physical and chemical properties, such as highest mechanical properties, metallic conductivity and semi-conductivity because of their chirality difference, excellent field emitting performance, electrical conductance change in different atmospheres, high surface functionization ability, and unique gas adsorption behavior, just to name a few. Due to those excellent properties, carbon nanotubes are expected to be applied widely in various high-tech fields, for example, as field emitting materials in flat panel displaying devices, as strongest cable for space elevator, nano-probes in scanning probe microscopy, high sensitivity nano-devices for gas sensing, basic materials in nano-electronic devices, etc. The recent progress and breakthrough in above aspects of carbon nanotubes will be overviewed and some of our research results in these fields will be reported.