



MAX-PLANCK-GESELLSCHAFT



**Nano-Carbon as High-performance Catalyst:
Carbon Nanofilaments and Nanotubes in Oxidative Dehydrogenation of
Ethylbenzene to Styrene: Structure-Activity Relationship**

D.S. Su

*Fritz-Haber-Institut der Max Planck Gesellschaft, Faradayweg 4-6, D-14195 Berlin,
Germany*

Abstract

The carbon nanofilaments and nanotubes of the comparable particle sizes and structure element shapes have been tested for the activity in oxidative dehydrogenation of ethylbenzene to styrene at 788 K. The comparison of the catalytic tests over the carbon nanotubes and nanofilaments and their structural characterisations with TEM reveal that the function of such carbon catalysts is uniquely related to their degree of crystallinity. This fact was also correlated with TPO experiments showed the different resistance of carbon nanofilaments and nanotubes against oxidation what reflects the difference in the crystalline structure of these carbon materials. It was found that more well-crystallized carbon nanostructure (MWNTs-A) was superior in catalysis in comparison to less perfect carbon nanotubes and nanofilaments. High degree of crystallinity supplies a higher stability toward oxidation and also higher oxygen activation due to metallic properties of the basal graphene planes.