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Clarifying the Rules for the Highly Efficient Growth of Carbon Nanotubes DON FUTABA, JUNDAI GOTOU, SATOSHI YASUDA, TAKEO YAMADA, MOTOO YUMURA, KENJI HATA, Nanotube Research Center, AIST — In water-assisted chemical vapor deposition (CVD), the addition of a growth enhancer, e.g. water, to the ambient of normal hydrocarbon dramatically improves growth efficiency resulting in vertically aligned forests [1]. Here, we present a generalized picture of water-assisted CVD (Super-growth) by demonstrating that highly efficient growth of carbon nanotubes (CNTs) is possible by, essentially, a countless number of growth enhancers exemplified here by alcohols ethers, esters, ketones, aldehydes, and even carbon dioxide. From an extensive investigation, we found that the key for highly efficient growth is to use two essential ingredients: 1) a carbon source not containing oxygen, and 2) a growth enhancer containing oxygen. We believe that this new understanding of CNT synthesis further cultivates and expands the world of CVD where innumerable new and completely unexplored growth ambients can emerge that would lead to further scientific discovery [1] K. Hata *et al*, *Science*, **306**, 1241 (2004).

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