

Acetylene Assisted Fast Growth of Vertically Aligned Single Walled Carbon Nanotubes in Alcohol Catalytic Chemical Vapor Deposition

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With an *in situ* optical absorption, [1] we studied the influences of different foreign molecules on the activity of Co/Mo in alcohol catalytic chemical vapor deposition (ACCVD). An interesting growth acceleration phenomenon was observed when acetylene was introduced to growing SWNTs. Fig. 1a shows that growth rate was enhanced almost 10 times in case of only 1% acetylene. However, pure acetylene of same partial pressure deactivated catalysts in a couple of seconds, no matter with or without an cap formed from ethanol. Then, when ethanol was re-supplied, the activity of these partially poisoned catalyst particles could be recovered, as shown in Fig. 1b. Therefore, the importance of ethanol for SWNT growth, not only at the beginning stage, was demonstrated and detailed mechanism is to be discussed. Several other recent results [2, 3] on the growth mechanism and structure control of vertically aligned SWNTs in ACCVD will also be presented.

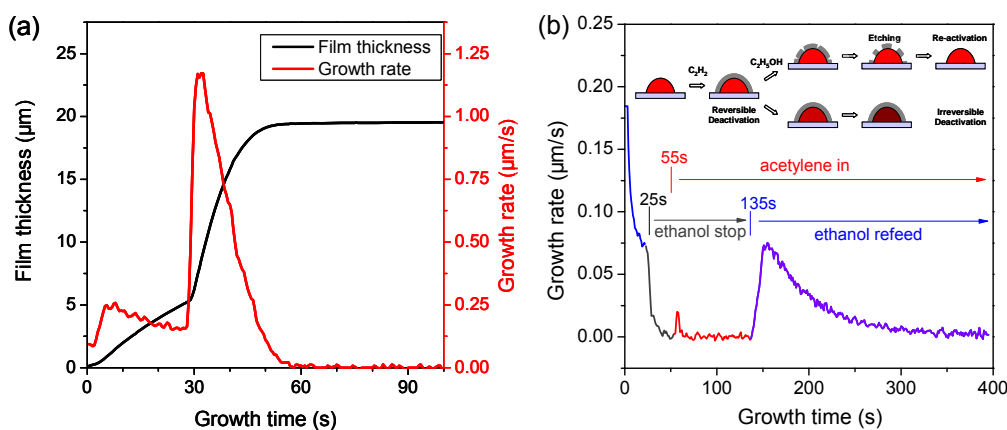


Figure 1. Acetylene assisted ACCVD: (a) a typical growth curve showing growth can be significantly accelerated when acetylene is introduced; (b) a growth started with ethanol and continued by only acetylene, indicating that, without ethanol, catalyst will be deactivated in seconds but this partial poisoned catalyst can be re-activated by ethanol. A possible mechanism was proposed as the inset.

References

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