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Growth transition from single wall- to double walled- carbon nanotubes by using acetylene gas[1] VIJAYA KAYASTHA, Michigan Tech University, YOKE KHIN YAP, Michigan Tech University — Based on a growth model that we have proposed for multiwalled carbon nanotubes (CNTs) [1, 2], we found that similar mechanism is applied for the growth of single wall- and double walled- CNTs by acetylene gas. This model combines disociative adsorption of acetylene molecules on Fe catalyst and the vapor-liquid-solid mechanism. Basically, the growth is the consequence of optimization of decomposition rate of acetylene molecules as referred to the diffusion rate and segregation rate of carbon into and from the catalyst. For the growth of single wall- and double walled- CNTs, catalytic film consists of layers of aluminum, iron, and molybdenum were used. We found that samples grown at $\sim$600-700 ^{o}C contained more than 80% double walled CNTs with diameters in the range 3-5nm and length 15 μm. These CNTs are vertically aligned on substrates. As the temperature increased to 1000 ^{o}C the growth of single wall CNTs are detected. [1]. Kayastha et al., APL 86, 253105 (2005), [2] Kayastha et al., APL 85, 3265 (2004).

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