Floated Catalyst CVD Generation of Single-Walled Carbon Nanotubes from Alcohol

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We have proposed the new catalytic CVD generation technique of SWNTs from alcohol. By using alcohol as a carbon source, high-purity SWNTs were produced at relatively low temperature (550-900 ^{o}C), probably because oxygen atoms contained in alcohol molecules prohibited the generation of side products. Here, it was demonstrated that the same mechanism was applicable to other configuration, a floated catalyst type generation of SWNTs. Using ferrocene as a precursor of floated iron catalyst clusters, high-purity SWNTs were generated from alcohol. Mist of ferrocene ethanol solution was injected into a quartz tube, which was heated by an electronic furnace and pumped by a rotary vacuum pump. Keeping the pressure of quartz tube at about 200 Torr for a few minutes, black soot was collected at a trap located at downstream of quartz tube. Raman scattering, TEM, SEM and TGA showed the generation of high-quality SWNTs. This simple technique is expected to be an efficient low-cost generation technique of bulk SWNTs.