

Separation of SWNTs and Carbon Impurities by Chemical Modification

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The arc discharge method is widely used for large-scale production of SWNTs. However, the as-prepared SWNTs (AP-SWNTs) contain impurities such as amorphous carbon, nanoparticle, and metal catalyst. Thus, purification of the arc-produced SWNTs is significant for fundamental researches. To date, a number of purification methods including air oxidation [1], wet chemical oxidation [2], filtration [3], and centrifugation [4] are available. Here, we report an effective method for separating of carbon impurities from SWNTs by chemical modification.

AP-SWNTs, produced by the arc discharge method, were successively treated with a mixture of $\text{H}_2\text{SO}_4/\text{HNO}_3$ and $\text{H}_2\text{SO}_4/\text{H}_2\text{O}_2$ to give the oxidized and shortened SWNTs (SWNTsCOOH) [2]. Such obtained sample was sonically dispersed in a dry N,N-dimethylformamide (DMF) containing 1% of aniline. After a large amount of octadecylamine (ODA) and dicyclohexylcarbodiimide (DCC) were added, the resulting mixture was heated at 120 °C for 60 h and then filtrated with a PTFE filter. The SEM image of functionalized SWNTs (SWNTsCONHR) showed that its purity is higher than those of AP-SWNTs and SWNTsCOOH.

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