

## Standard Operating Procedure (CNT CVD System)

<b>Facility:</b>	Polymer Reaction Engineering Laboratory Chemical and Biomolecular Engineering Department
<b>Lab Director:</b>	Prof. Kyu Yong Choi
<b>Scope:</b>	This SOP details the use of Chemical Vapor Deposition system for Carbon Nanotubes in the Laboratory.
<b>Last Revision:</b>	December 1, 2014 by Lisa Wiest

**Caution:** The chemicals and equipment used in this procedure are **hazardous and dangerous**.  
Always wear heat gloves when handling equipment with high temperatures.  
Always wear goggles, rubber gloves, lab coat, closed toed shoes, etc.

## System Operating Procedure

1. Place sample in the quartz tube and fasten the pressure gauge and outlet nozzle.
2. Connect the vacuum hose and vacuum out the quartz tube, including the lines to the nitrogen, nitrogen/hydrogen, and acetylene tanks for 20 minutes.
3. Open nitrogen with 5% hydrogen tank and fill the quartz tube. Turn off the vacuum. Set the flow meter to 150 cc/min.
4. Set the furnace temperature to 250°C.
5. Once the temperature reaches 250°C, allow the sample to reduce for 30 minutes.
6. Then vacuum out the remaining nitrogen/hydrogen gas for 5 minutes.
7. Open the pure nitrogen tank and fill the quartz tube. Turn off the vacuum. Set the flow meter to 200 cc/min.
8. Remove the quartz tube from the furnace. Set the furnace temperature to 900°C.
9. Open the acetylene tank. Set the flow meter to 12.5 cc/min.
10. When the furnace reaches 900°C, place the quartz tube in the furnace again.  
Allow deposition of desired time.
11. To end the experiment, remove the quartz tube from the furnace, close the acetylene line, and place the nitrogen line at 2 cc/min. Turn off the furnace.
12. To clean the quartz tube, place a quartz tube in the furnace without the pressure gauge and outlet nozzle at 700°C for 30 minutes.

## **CNT CVD System Policy**

1. The Instrument is managed by Lisa Wiest. If you would like to use the instrument, come to see Lisa Wiest first. Use the instrument properly as described in the CNT CVD SOP. If you find something wrong, alert Lisa Wiest immediately.
2. Always wear protective equipment and handle with care when dealing with high temperatures.