



Name of the Technology: **Thermal Chemical Vapour Deposition (CVD) set-up for Graphene deposition**

Summary:

A Thermal Chemical Vapor Deposition (CVD) setup has been developed in CSIR-NPL to produce high quality Graphene layers of about 50 mm in dimension. Using this set-up, it is possible to create single to few layers of Graphene having distinct electrical and optical properties with unmatched performance.

The unique properties of Graphene have triggered numerous technological advances in the fields of optoelectronics, biosensors, photovoltaics and many high frequency electronic devices. Thus, development of deposition technique producing superior quality Graphene having uniform thickness over large area is of great significance.



Figure: demonstrates the Graphene deposition on Cu substrate by CVD Set-up

Applications: Flexible Electronics, High-Frequency Transistors, Logic Transistors, Optical Modulators, Photo-detectors, Mode-Locked Laser/THz generator, Optical Polarization controller, Composite materials, paints and coatings, Drug delivery, Tissue engineering and many more.

Specifications: **Single Zone split Furnace (front side open); Operating temperature range:** 800-1150 ° C; **Zone temperature Accuracy:** $\pm 1^\circ\text{C}$; **Hot Zone:** 450 mm; **Overall length** = 700 mm(approx.); **Operating voltage:** 220-240V single phase AC supply; **Quartz tube:** ID=50-60mm/OD=55-65mm; **Length:** 1200 mm suitable for max temperature of 1150° C, with SS 304 and flanges having arrangement for purging of gases; **Vacuum system:** comprises of Rotary High Vacuum Pump with vacuum in the range of 10^{-2} - 10^{-3} torr on pump head and upto 10^{-2} torr in process tube; Mass Flow Meter for hydrogen, argon and hydrocarbon gas **Chiller:** Cold water 10°C with circulation pump.



Advantages: Simple to operate, easy to handle, low cost and indigenously developed system

User Industries: Academic Institutes, R & D Labs, Industries, CVD Manufacturers etc

Readiness level of the Technology:

Idea	Concept Definition	Proof of Concept	Prototype	Lab Validation	Technology Development	Technology Demonstration	Technology Integrated	Market Launch

Related Patent:

Patent No: **Know How**

Country: --- NA

Publication Date: --- NA

Grant Date: --- Na

Year of Introduction: 2016

Broad Area/Category: Electronic and Instrumentation