Scaling up CVD Graphene and TMDC production

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Chemical Vapour Deposition process has long been accepted as a key path for scaling up graphene and TMDC to industrial scale.

This presentation focussed on how AIXTRON, a world leader in deposition equipment, develops scaling up tools and processes for graphene and TMDC and specifically how AIXTRON develops different technology platforms for the semiconductor market and for other large area markets beyond the semiconductor industry.

The semiconductor market typically uses wafer scale tools and equipment with a very high level of cleanliness, automation, process and quality control. An illustration of a typical AIXTRON Metal Organic CVD (MOCVD) equipment is shown in Figure 1 (right). This technology platform for the semiconductor market is for growth of high quality continuous 2D materials over wafers up to 300mm and can be integrated into a standard fab process.

High quality graphene films has significant commercial potential beyond semiconductor applications such as filtration, transparent conductors and many other markets. For these markets where the total area of graphene required exceed millions of m2 per year, CVD roll to roll production of graphene on continuous foils is a more viable production method and is also being developed within AIXTRON. Figure 1 (left) shows AIXTRON's NEUTRON pilot roll to roll equipment for graphene production.

Figure 1: Illustration of AIXTRON's NEUTRON Pilot scale Roll to Roll CVD equipment (left) and an MOVCD system for TMDC (right).