(MO)CVD solutions for 300 mm Fab integration of 2D materials

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There is an increasing demand for deposition equipment which allow wafer scale synthesis of two dimensional (2D) materials. This stipulated high-volume manufacturers and tool suppliers to not only investigate performance of synthesized 2D films but also their implementation into a Fab-compatible environment. In this talk, we will start by presenting the main applications that are being considered using 2D materials at the different levels of an integrated circuit (IC) chip. We also show how 2D materials enable solutions for coatings and different optoelectronic applications. In the second part, we present on how AIXTRON can mature 300 mm product solutions (Figure 1) to offer 2D materials in volume manufacturing for the IC fabs of tomorrow. We will focus on layer uniformity (figure 2) and repeatable performance of 2D films. The talk is expected to set a comprehensive overview of the most recent achievements in wafer scale growth of 2D materials and provide the guidelines for their scalable synthesis.

Figures

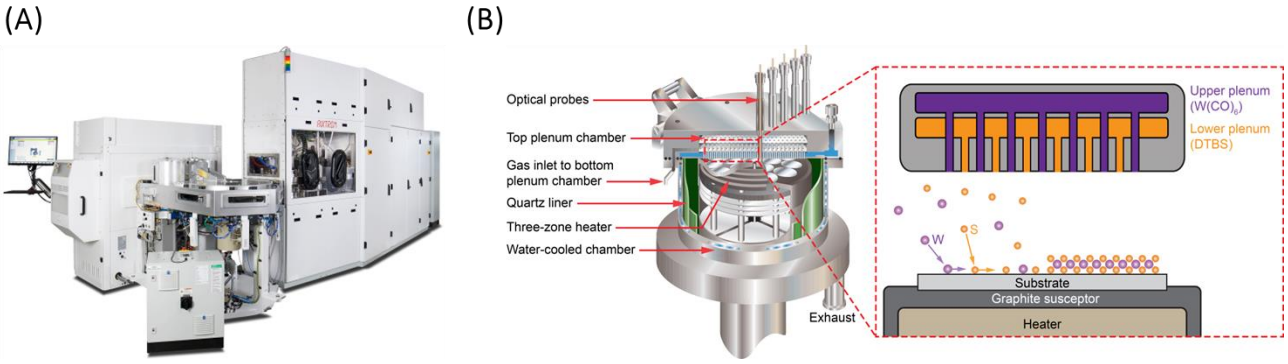

Figure 1: A) Photograph of an AIXTRON 300 mm close coupled showerhead system and **B)** a schematic illustration of its working principle exemplified with the growth of WS_2

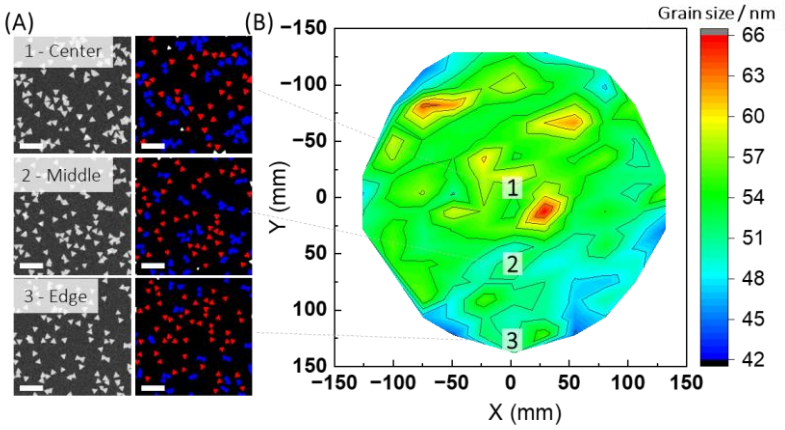

Figure 2: (A) (1×1 µm)² SEM images showing MoS_2 islands at 3 locations on a 300 mm Si/SiO_2 wafer. **(B)** The contour plot displays the grain size distribution (52.8 ± 3.9 nm) generated from analysis of 149 SEM images acquired in-line. 2D grain size, nucleation density and coverage are used as evaluation metrics for the standardized assessment of wafer-scale 2D materials growth.